2/41

THE BULLETIN

of the

AMERICAN ASSOCIATION

of

NURSE ANESTHETISTS

FEBRUARY

1941

VOLUME 9 NUMBER 1

Unsurpassed for Efficiency

★

The Puritan Cylinder VALVE and Protective VALVE SEAL are designed for

Greater Service

EASIER OPERATING VALVE—made possible by a ***special seat material.***

LESS GAS LEAKAGE—an advantage given by a ****special stem packing material.***

MORE PROTECTION FOR OUTLET—permitted by the ***Puritan valve seal.***

*Developed after many years of experiment in Puritan's Medical Gas Research Laboratories.

Write for complete details, including Illustrated Booklet . . . "Puritan Gas Therapy Equipment."

PRICE REDUCTION NOW IN EFFECT

Puritan MASK and BAG, complete, now.....$7.00

Widespread acceptance of this unit for effective and economic administration of therapeutic gases has made possible production economies which are now passed along as savings to our customers.

SEE YOUR PURITAN DEALER OR WRITE OUR NEAREST OFFICE

PURITAN COMPRESSED GAS CORP.

BALTIMORE · BOSTON · CHICAGO · CINCINNATI · DETROIT · KANSAS CITY · ST. PAUL · ST. LOUIS · NEW YORK

"Puritan Maid" Gases and Gas Therapy Equipment

PURITAN DEALERS IN MOST PRINCIPAL CITIES

☆

When
DEPENDABILITY
is essential

With Soda Lime you must be sure of the absolute reliability of your supply. You have a right to demand a product that has stood the test of time.

Wilson Soda Lime has been proved through two decades of faithful performance. Unflagging research has constantly improved it, and rigorous laboratory control assures its dependable uniformity.

Insist on Genuine Wilson Soda Lime . . . the *accepted* Carbon Dioxide absorbent for the medical profession. Made by Dewey and Almy Chemical Company. Packed in economical, easy-to-use pails.

CONVENIENTLY AVAILABLE FROM YOUR DEALER OR SUPPLY HOUSE

Genuine
WILSON SODA LIME

SCALPEL
SPONGE
NEEDLE

and

MALLINCKRODT ANESTHETICS

The success of the operation depends primarily upon the skill of the surgeon and the anesthetist. This skill of the anesthetist is reflected in the precise technique employed and by the selection of an anesthetic which is trustworthy beyond a shadow of a doubt.

Recognizing the absolute necessity for the highest purity and uniform dependability in anesthesia, the Mallinckrodt research staff has pioneered in the development of improved processes of manufacture, packaging, and in the method of analysis for the staple anesthetic agents.

As a result of this painstaking research over a period of years, Mallinckrodt Ether for Anesthesia today is of an order of purity and uniformity far superior to the best anesthetic ether obtainable a few years ago. For the utmost in efficiency and maximum safety, rely upon . . .

MALLINCKRODT ETHER *for Anesthesia*

Other fine Mallinckrodt Anesthetics include:

Procaine Hydrochloride • Paraldehyde U.S.P. XI
MALLINCKRODT Cyclopropane* • Chloroform

FINE CHEMICALS
Mallinckrodt
SINCE 1867

* Cyclopropane (Mallinckrodt) may also be obtained through the various offices of the Puritan Compressed Gas Corporation of Kansas City.

MALLINCKRODT CHEMICAL WORKS

St. Louis • Chicago • New York • Philadelphia • Montreal • Toronto

The Bulletin of the American Association of Nurse Anesthetists

VOLUME 9, NO. 1 FEBRUARY, 1941

THE CONTENTS

THE DIABETIC AS A SUBJECT FOR ANESTHESIA

HOWARD F. ROOT, M.D., and HERBERT CAMMERER, M.D.
The George F. Baker Clinic;
ELLIOTT P. JOSLIN, M.D.
Medical Director, New England Deaconess Hospital, Boston, Massachusetts

Read at the eighth annual meeting of the American Association of Nurse Anesthetists, held in Boston, Mass., September 16-19, 1940.

Incidence of Surgical Anesthesia in Diabetes. It is not my function to tell you what anesthetics to employ with diabetic patients, but rather to present some facts about the patients with whom you are to deal. The number of diabetic patients in all communities is steadily growing, and the increasing duration of life brings many into those age periods in which complications requiring surgery become increasingly frequent. Practically every other diabetic sooner or later will require surgery. In the following table is shown a summary of 2941 operations on diabetic patients, divided by ages.

Table 1[1]. *Diabetic Operations from January 1, 1923 to July 1, 1939*

At the New England Deaconess Hospital

	Age at Operation			
	0-39	40-60	60-89	Total
Major amputations	4	190	431	625
Toes, fingers	6	144	173	323
Carbuncles	5	56	42	103
Ulcers, abscesses	108	155	95	358
Thyroid	38	129	57	224
Tonsillectomy	128	39	6	173
Laparotomy	79	180	102	361
Genito-urinary	16	45	62	123
Pelvirectal	32	97	48	177
Ocular	23	47	59	129
Miscellaneous	91	141	113	345
Total	530	1223	1188	2941
Number fatal	16	88	127	231
Per cent fatal	3.0	7.2	10.7	7.9

It is seen that 18 per cent were under forty years at the time of operation, 42 per cent were between forty and sixty years, and 40 per cent were over sixty years at the time of operation. The variety of surgical procedures carried out at the New England Deaconess Hospital appears from the various classifications. As experience has increased, although the diabetic patient presents a variety of peculiarities which must be understood if successful anesthesia is to be carried out, the choice of anesthesia has come to be made solely on the basis of what anesthetic will best meet the needs of the surgeon. With our better understanding of diabetes and its complications, and particularly with the availability of insulin for use both before and after operation, it has become possible to protect the patient against metabolic disturbances during any type of anesthesia found most useful for the particular task at hand. Formerly surgery of necessity only was performed, but now elective and preventive surgery is freely done in diabetic patients.

Effects of Anesthesia upon Diabetes. In general the same effects observed in normal patients occur in diabetic patients under anesthesia, exaggerated in proportion to the degree of the metabolic disturbance. Anesthetic agents by the very qualities which make them capable of producing anesthesia, cause a marked disturbance

in metabolism in all the cells of the body which they affect. Although the relation of anesthesia to cardiac, pulmonary and cerebral complications is of equal importance in diabetics and non-diabetics, its influence on carbohydrate metabolism and acidosis stands first among the reasons for a careful choice of the anesthetic.

Formerly the increased respiratory rate and depth was given as a reason for acidosis in anesthesia. In our diabetic patients at the Deaconess Hospital studies of the carbon dioxide combining power of the blood indicated clearly that it was the type of drug used in inducing anesthesia which was of chief importance.[2] Thus it happened that with certain patients who underwent multiple operations it was possible to use different anesthesias in the same diabetic patient. A comparison of ethylene and nitrous oxide showed that the carbon dioxide combining power of the blood fell from 60 to 44 volumes per cent with nitrous oxide but remained constant at 50 volumes per cent when ethylene was used. In another patient ethylene and ether were compared. In this patient the fall in carbon dioxide combining power was from 60 volumes to 45 volumes with ethylene in forty-five minutes of anesthesia. At the end of two and one-quarter hours the carbon dioxide had fallen to 44 volumes per cent. On the other hand, the rise of sugar in the blood with ethylene was not so great as it was with ether. Thus in this patient ether caused less acidosis but caused a greater rise in blood sugar than did ethylene. These effects did not seem to be due to any change in respiration nor were they associated with any pulmonary infection. They seemed more directly related to kidney function. Nevertheless, important complications within the lungs have occurred with our diabetic patients, although with no more frequency than in non-diabetics.

Case No. 16280, age 65 years, suffering from auricular fibrillation and a toxic thyroid, was kept pink through the operation under cyclopropane and oxygen. In spite of pneumonia and an old pulmonary infarct he recovered. Case No. 7243, age 69 years, with gallstones, had an abrupt rise in temperature within twelve hours after operation, due not to true pneumonia but to multiple small areas of atelectasis. Her recovery within a few days was uneventful.

Renal function is generally recognized to be of great importance under anesthesia and yet the effects of anesthesia upon kidney function are not clearly understood. Stehle, Bourne, and Barbour studied the rate of excretion of sodium and potassium in ether anesthesia and found a great decrease during etherization but such a marked increase after etherization that the total amount of alkali eliminated for the experimental day was high.[3] MacNider showed that if anuria is produced under ether the evidences of kidney impairment, albumin, and anuria were more easily produced in old dogs than in young ones, a point of particular importance in diabetes, since in diabetic patients the great percentage of operations is done late in life[4] In such patients examined postmortem it is always possible to show, with few exceptions, that there is some degree of vascular nephritis. One of the methods of the production of acidosis is by a disturbance of the ammonia metabolism, a point stressed by Rabinowitch.[5]

Cerebral complications in our diabetic patients have been extremely rare because of constant concern for the avoidance of anoxemia. For this reason the use of nitrous oxide has been practically eliminated for the last fifteen years except for purposes of induction, or for very brief periods

such as are required for the extraction of teeth or the incision of small abscesses. The dangers of anoxemia in diabetic patients never should be forgotten. They are illustrated not merely as during and after anesthesia, but during severe stages of hypoglycemia, produced by overdoses of insulin.

Carbohydrate metabolism is often seriously affected under general anesthetics. An increase in the sugar of the blood is characteristic and in the diabetic patient, treated with none or insufficient insulin, the increase in blood sugar may be excessive and associated with acidosis. The reason for this increase in blood sugar is probably a serious disturbance of liver function, which prevents the conversion of dextrose into glycogen and the storage of glycogen in the liver. It also results in a breakdown of stored glycogen, which again contributes to the hyperglycemia. An excellent illustration of the effect of anesthesia in producing true liver storm occurred in the patient in case No. 10142, age 60 years, with diabetes of 12.8 years' duration. The patient entered the hospital for cholecystectomy, the urine was sugar free, the blood sugar was normal and she was receiving 10 units of insulin. Her diet contained 160 grams of carbohydrate. She seemed in perfect condition for operation, which was performed without difficulty by Dr. L. S. McKittrick, using novocaine, nitrous oxide for a few minutes and ether for the final stages. Following operation the patient had a typical liver storm with high fever and prostration. No sign of peritonitis, hemorrhage or infection was present. The explanation seemed more clear when chemical analysis of a section of the liver removed at the end of operation showed that glycogen was absent and that the fatty content of the liver had risen to 15 per cent. When this patient returned for an operation a year later, we gave not only a diet rich in carbohydrate but administered glucose intravenously for two mornings preceding operation, and the operation, which was for extensive malignant disease in the abdomen, proceeded without any serious after-effects.

Operations During 1939 and 1940. The table first given in this paper summarizes operations beginning in 1923 and ending in July 1939. During the twelve months ending July 1940 a total of 291 operations on diabetic patients have been done. Of these patients, 187 were females and 104 were males. The same preponderance of females is found in a series reported by Hale and Tovell.[6] In their series 108 were males and 136 females. Our youngest patient was 5 years of age and the oldest 84 years. The severity of the diabetes varied greatly but I do not venture to classify patients on the basis of severity of their disease because we see such tremendous variations in the apparent severity of the disease within a few days or weeks. Most important of all, let no one think that the patient with apparently mild diabetes cannot develop coma during the changes incident to anesthesia and major surgery, and especially under the influence of hyperthyroidism. The important thing for the anesthetist is to know definitely whether or not the patient has diabetes. The patient who enters the hospital with a sugar-free urine and has no blood-sugar test done, may prove to be a diabetic whose susceptibility to acidosis and coma is fully as great as that of the young person taking a large amount of insulin. Nevertheless, one may form an idea of the diabetes in these patients by quoting from McKittrick and Root, a summary of 193 diabetic cases recently operated upon at the Deaconess Hospital.[7] Of this group 79

took protamine zinc insulin alone, 79 took crystalline insulin combined with protamine zinc insulin, 27 took regular insulin only and 8 were taking no insulin before operation. At their discharge 103 of these patients were taking protamine zinc insulin only, one dose a day, 65 were taking one dose of protamine zinc insulin and one dose of regular insulin, the average amount being 12 units of crystalline insulin and 40 units of protamine zinc insulin, and 23 patients continued taking crystalline insulin only; 2 patients only were taking no insulin at discharge.

Types of Operations. In this series of 291 cases, 129 operations were performed upon the feet or legs; 14 appendectomies, 7 cholecystectomies, and 8 operations for carcinoma of various sites were included. The remainder were of diverse types. Slightly over half of these operations were done under spinal anesthesia, using for the most part 75 to 100 milligrams of novocain. The former use of morphine has been discontinued because in the older, feeble diabetic patients, a small dose of morphine has an extraordinarily depressing effect upon respiration. Ether was used in 59 cases; cyclopropane was used in 10 thyroid operations. Twelve operations were done on diabetic patients with infections of the feet in which sensory disturbances in the form of anesthesia of the involved foot were such that no type of anesthesia was necessary for the incision. The remaining 63 operations were done with nitrous oxide anesthesia for brief periods, or followed by ether when longer anesthetization was required.

Table No. 2, *Causes of Low Mortality.* All eight deaths took place many days after operation from causes unrelated to the anesthesia. While one may conclude from this series that it is possible to operate upon diabetic patients without having any fatality traceable to the anesthesia, it is nevertheless true that these favorable results have been due first to skillful surgery, then to the proper choice and administration of anesthetic agents by experienced an-

TABLE NO. 2

MORTALITY—(EIGHT DEATHS)—2.7 PER CENT

Case No.	*Age of Patient*		*Death*
No. 17158	68	Appendix abscess and peritonitis	4 days after drainage of abscess
No. 1421	58	Spontaneous hypoglycemia due to a carcinoma of the island cells of the pancrea with metatases of the liver	4 weeks after operation
No. 19163	65	Lung abscess due to septicemia with Friedlander's bacillus	
No. 9849	57	Coronary occlusion 20 days after a minor foot operation	
No. 3526	82	Coronary occlusion after amputation of thigh for gangrene	
No. 19338	50	Liver abscess 2 months after drainage of appendix abscess	
No. 18571	72	Coronary occlusion after amputation through lower leg	
No. 18095	61	Drainage of cellulitis of back; death from streptococcus septicemia	

esthetists, and finally, to a keen appreciation of, and extended experience in the utilization of methods to prevent and treat the serious disturbances which may precede or follow major surgery and anesthesia. An illustrative case may be cited.

Case No. 19110, a sixty-nine year old housewife, entered the Deaconess Hospital on June 17, 1940, for treatment of jaundice and uncontrolled diabetes. Early in December 1939, she had gone to another hospital with attacks of pain in the abdomen, nausea, vomiting, chills, fever, and jaundice. Three attacks had occurred in the preceding six years. Diabetes began with polyuria and polydipsia, genital itching, and weight loss. At the hospital where she was treated exploration was advised, but refused. During the next few months jaundice was moderate, but never absent. The diabetes became more severe. Whereas she had required only 30 units of insulin a day in February 1940, when she entered the Deaconess Hospital in June she was taking 50 units of protamine zinc insulin and 30 units of crystalline insulin and the blood sugar was 440 milligrams with 8.4 per cent sugar in the urine. Even with increasing insulin dose glycosuria persisted. Because of the intense and long-standing jaundice and the probability of considerable damage to the liver parenchyma, she was given not only a diet of 175 grams of carbohydrate, but in addition received glucose intravenously. When the glucose administration by vein was reduced, the patient developed acidosis, and the carbon dioxide combining power of the blood fell to 35 volumes per cent. As may be seen from Table No. 3, although she had been requiring only 160 to 200 units of insulin daily before the operation, on the day of operation the insulin requirement rose to 580 units and during the next few days attained a maximum of 1000 units a day. The jaundice was not extreme, blood bilirubin being 7.3 milligrams. The blood phosphatase value was 44.5 Bodanski units.

TABLE NO. 3

High Insulin Requirement During Jaundice
Removal of Gall Stones in Common Duct (Case No. 19110)

1940	Insulin units	Blood Sugar Mgs.	Sugar in Urine gms.	Carbohydrate Intake gms.	Blood Bilirubin mgs.
June 18	110	290	89	176	3.4
June 24	160	290	168	152	7.3
June 26	580	Cholecystectomy—Nitrous oxide and ether			
July 3	1000	350	136	140	3.2
July 26	44	140	0	166	1.4

The operation was described by Dr. L. S. McKittrick as not especially difficult. It was performed under nitrous oxide, oxygen, and ether. A large distended gallbladder with a dilated common duct was found and several stones in the region of the ampulla were removed. Pathological section of the liver showed adequate glycogen storage and areas of focal necrosis. Her recovery surgically was uncomplicated. The high degree of insulin resistance persisted for more than two weeks after the anesthesia and operation and then suddenly diminished.

Now in September 1940, her insulin requirement is only 18 units of protamine zinc insulin once daily. This high degree of insulin resistance was

apparently due to an obstruction of the common bile duct with its effect upon the liver primarily, but it made the patient particularly vulnerable to anesthesia and to surgical treatment. Most of our diabetic patients who are acutely ill with an infection or febrile state show an increased need for insulin which may change rapidly either under the influence of anesthesia or the surgical manipulation or both, and then following operation may during the next few days or the next few weeks show a similarly rapid or sometimes a delayed return to the normal insulin requirement present before operation. To store glycogen in the diabetic liver has been a fundamental doctrine and still is a proper objective for diabetic treatment, particularly at the time of operation. Yet diabetic patients must vary greatly in their capacity to store glycogen and particularly in their resistance to the effect of various anesthetics in breaking down glycogen stores rapidly.

At present we are attempting to study the problem of the glycogen stores of diabetic patients by investigating the respiratory metabolism, with the cooperation of Dr. Thorne and the Carpenter Carnegie Nutrition Laboratory. We are studying the respiratory quotient in fasting conditions and the effects of increasing the carborydrate in the diet before and after operation. So far it is evident that many diabetic patients will demonstrate by a rise in the respiratory quotient that the proper utilization of 175 to 225 grams of carbohydrate will raise the fasting respiratory quotient, thus indicating in all probability an increase in stored glycogen and therefore better preparation for surgery and anesthesia.

Complications in the Diabetic. The diabetic over fifty years of age with diabetes of more than five years, especially if he was treated for a considerable period of time without insulin or with an improperly balanced diet, is almost certain to have some degree of coronary arteriosclerosis. It may be said that practically all gall stone diabetics and diabetics with gangrene have coronary disease. Actually, in a follow-up of some 500 cases of surgery the final cause of death has been chiefly from coronary disease. Marked loss of weight has preceded the surgical condition in many diabetic patients. This is particularly true of the older patients with gangrenous lesions. Actually, in 100 surgical patients we found that the average loss of weight had been 54 pounds. Beware of pulmonary tuberculosis in the diabetic patient who has lost weight excessively; also, remember that with that excessive loss of weight there may have been a deficiency in vitamins in the diet or in their utilization, which not only needs treatment that will control the entire operation, but may have bearing on *that* patient's susceptibility to infection and impair wound healing.

Diabetic acidosis, or coma, is insidious at onset, deceptive in symptoms, and may steal upon the patient like a thief in the night. The patient in case No. 4289 arrived at the Deaconess Hospital one evening with a blood sugar of 120 milligrams, apparently quite normal. Thyroidism was suspected and a consultation held. The next morning at 7:00 o'clock the patient was in profound diabetic coma, the most rapidly developing case of diabetic coma we have ever seen. The diagnosis of coma may be made by the nose if you recognize the odor of acetone, or by the eyes if the slightly increased depth and rapidity of respirations is noted, or by the touch if you appreciate the cold, dry skin and the dry tongue; chemically by the blood and urine tests. Leukocytosis may be a sign of diabetic coma rather than of appendicitis. White counts up

to 30,000 or 40,000 or even 60,000 are not rare in diabetic coma. Recently a boy, case No. 10775, 21 years of age, came to the Deaconess Hospital with a history of pain in the abdomen, nausea, and vomiting. He had, however, diabetic coma with a carbon dioxide combining power in the blood of 18 volumes per cent, and a blood sugar of 600 milligrams per cent. Dr. T. C. Pratt, long experienced in diabetic surgery, analyzed the history, found localized tenderness in addition to the generalized rigidity of the abdomen so common in diabetic coma, operated in spite of the coma and removed a gangrenous appendix. The boy recovered.

The differential diagnosis of hypoglycemia and hyperglycemia is of tremendous importance. To the anesthetist it is necessary to know what insulin the patient has had prior to operation, and whether during the anesthesia the signs and symptoms of grave and serious hypoglycemia are being masked. One child underwent tonsillectomy during such an insulin reaction, fortunately without harm. In hypoglycemia the symptoms usually are sudden in onset, with a history of unusual exercise which makes the insulin dose much more active, or a history of taking little food and more insulin helps to establish the diagnosis, which can be positively confirmed only by a blood test or urine test which shows the urine sugar free or the blood sugar below 80 milligrams per 100 cc. Hypoglycemia is a grave emergency. Unless recognized and the necessary treatment by the administration of glucose given promptly within thirty minutes or an hour, death may result. Diabetic coma, on the other hand, is slower in onset. Usually a period of several days of weakness, increased thirst, nausea, vomiting, and abdominal pain are followed by the onset of rapid and deep respirations, drowsiness and final unconsciousness.

For the anesthetist, therefore, the knowledge of preoperative and also postoperative treatment is important. In an operation of election we prefer a 48-hour period of observation, using the diet to which the patient has been accustomed, except that the food is made more simple; the bowels are moved and insulin is given in amounts comparable to the patient's usual requirements. If the patient is taking regular insulin, no attempt is made to change to protamine zinc insulin before operation. However, protamine zinc insulin given on the morning of operation, by virtue of its long continued action gives excellent protection during the period of operation. It is less apt to cause an insulin reaction than crystalline insulin. Yet the surgeon and anesthetist know that protamine zinc insulin is constantly active during the operation, preventing the breakdown of liver glycogen to sugar and counteracting the tendency to acidosis. Usually one-half to two-thirds of the dose of insulin is given on the morning preceding operation. We no longer give carbohydrate-containing fluid four hours before operation, since experience has indicated that in many instances the fluid will still be in the stomach at the time of operation and cannot be depended upon to increase the glycogen reserve. Actually it was apt to be a cause of danger, since it not only provided something to vomit, but there was a danger of aspiration of the vomitus and the corresponding evil effect upon the lungs. A fluid intake on preceding days such as will give an output of 1200 to 1500 cc. of urine is advisable. In general, fluids containing salt, such as broth, are given. If necessary, parenteral fluids in the form of physiological solutions of sodium chloride, with or without 5 per cent glucose, depending upon the carbohydrate need, are given.

Patients not previously under treatment may require more than twenty-four or forty-eight hours in order to have proper nourishment before operation and in order to have the diabetes under good control. We never postpone surgery in order to bring the blood sugar to normal or to make the urine sugar free. A little sugar in the urine and a blood sugar somewhat above normal are not contraindications for urgent surgery.

Emergency operations may be undertaken, as in the case of the boy cited, even in the presence of diacetic acid. However, if time permits, the urine should be rendered free of diacetic acid by doses of insulin which may be as little as 20 to 40 units or in unusual cases may be as high as 75 to 200 units. Emergency surgery performed under conditions of acidosis place some limitations on the magnitude of the operation to be done as well as on the use of such anesthetics as ether. Operations under these circumstances not only increase the difficulties of controlling the diabetic state, but are done on patients whose resistance to trauma and infection is below that which would be attained by more deliberate preparation. Following operations we usually test the urine by means of the Benedict's test every four hours, and give insulin of the crystalline type—15 units if the reaction is red, 10 units if yellow, and 5 units if yellow-green.

Bladder. The bladder, particularly in elderly diabetic patients, may lead to serious errors in treatment of the diabetes and in interpretation of the diabetes by reason of mistaken interpretation of tests for sugar in such residual urine, and in the second place is a serious hazard, since urinary stasis may cause infection which may flare up under the influence of anesthesia, surgery, and recumbency in bed. Such residual urine tested for sugar may show a red test when in reality the blood sugar has fallen to a figure below normal. To give insulin then, when a patient already has hypoglycemia, may not only be serious, but fatal. Failure of kidney function and a rising non-protein nitrogen of the blood following operation, may be due to the effect of the anesthesia upon the kidney, but the anesthetist will also need to be sure that it is not due to a diabetic bladder with back pressure and perhaps actual infection of the kidneys.

The administration of dextrose solution intravenously as a means of feeding the diabetic patient after operation is of great value, but it must not be forgotten that hypoglycemia develops easily if insulin is administered at the same time as the dextrose. Furthermore, if insulin is ordered according to the sugar present in the first urine passed after administration of intravenous glucose, hypoglycemia reactions will frequently occur. Therefore, we usually give only small doses of insulin at the same time that the glucose solution is given intravenously, and none is then given until a second urine specimen voided more than two hours after the injection has been completed.

The spinal fluid of the diabetic patient in every patient anesthetized by the spinal route is studied at the Deaconess Hospial not only for its glucose content, but for the total protein. The sugar in the spinal fluid parallels the blood sugar although its value is somewhat lower. Thus, if the blood sugar is 120 milligrams, the spinal sugar might be 70 to 80 milligrams. When the blood sugar rises, the spinal sugar also rises, but much more slowly, and the same is true when the blood sugar falls. Experimentally it has been shown that if hypoglycemia is produced, sugar may disappear from the spinal fluid. In some instances this is associated

with very severe damage to the brain. If glucose is given intravenously, sometimes the sugar fails to appear in the spinal fluid promptly. As yet we have not a complete picture of what use may be made of the determination of glucose in the spinal fluid in relation to anesthesia in diabetic patients, but further investigation is desirable.

SUMMARY

Types of surgery requiring anesthesia in diabetic patients in 2941 cases are classified.

The diabetic patient may undergo successfully any type of anesthesia found most advantageous for the surgery required, provided the particular effects of that type of anesthesia upon the diabetic metabolism are evaluated and proper preventive and therapeutic measures utilized.

The diabetes should be carefully controlled by means of a diet planned to provide good nutrition and the use of insulin, preferably protamine zinc insulin, supplemented as necessary by crystalline insulin.

Diabetics should go to the operating room with the liver well stocked with glycogen and with the urine free of diacetic acid and containing little or no sugar.

The mortality in diabetic patients following operation has in no case of this series been attributable directly to the anesthesia. Deaths are encountered almost in direct proportion to the age of the patient and almost exclusively after the fiftieth year.

References:

1. Joslin, Root, White, and Marble: Treatment of Diabetes Mellitus, 7th ed. Philadelphia, Lea & Febiger, 1940, p. 600.
2. McKittrick and Root: Diabetic Surgery. Philadelphia, Lea & Febiger, 1928, p. 73.
3. Stehle, Bourne and Barbour: Jour. Biol. Chem., 1922, *53*, 341.
4. MacNider: Sur., Gynec. and Obst., 1925, *40*, 492.
5. Rabinowitch: Anesthesia and Analgesia, 1925, *4*, 267.
6. Hale and Tovell: Surg. *3*, 104, 1937.
7. McKittrick and Root: Archives of Surgery, *40*, p. 1058, 1940.

REPEATED DOSAGE OF AVERTIN IN PLASTIC SURGERY

FORREST YOUNG, M.D., and HELEN M. GEISS, R.N.

From the Department of Surgery, University of Rochester School of Medicine and Dentistry, Rochester, New York

The ideal anesthetic should relieve apprehension, abolish pain and facilitate the surgical procedure. In addition, it is desirable that there be a rapid recovery postoperatively, that the margin of safety be wide and that the whole procedure be accompanied by complete amnesia. As we all know, there is as yet no perfect anesthetic which fulfills this ideal. Those which are now in common use have faults, some to a greater extent perhaps than others; and there are some which have been discarded for the most part or are in the gradual process of falling into disuse.

In plastic surgery a rather large percentage of the patients present deformities about the face. In selecting an anesthetic for this type of work certain conditions must be met. The first is that the agent must be such that the surgeon can work about the nose and mouth without too great hindrance

from the anesthetist or anesthetic apparatus and yet the patient remain adequately anesthetized, sometimes for considerable periods of time. Obviously, the ordinary methods of administering inhalation anesthesia, such as drop ether or closed mask nitrous oxide-ether, cannot be used because the field of operation is such that a closed airway cannot be maintained. The second condition which must be seriously considered is that a number of such corrections entail multiple operative steps and hence it is more than ordinarily important that apprehension of succeeding operative steps be reduced to a minimum.

The two forms of anesthesia probably most frequently employed in surgery of the face are intratracheal ether, and local. They both have advantages and disadvantages. Among their advantages may be mentioned the ease with which the surgeon may work unencumbered by the anesthetist. In this respect local anesthesia is of course ideal. Intrapharyngeal ether also imposes very little burden on the surgeon since the only apparatus in the way is the tube which carries the ether vapor. There is an added advantage in that since the airway is maintained automatically the anesthetist need not be near the field of operation, thus allowing more freedom to both surgeon and assistants. It is undoubtedly this factor of allowing easy access to the face that has caused these two modes of anesthesia to be so widely used in plastic surgery. In addition, among their advantages may be listed the successful abolition of pain, a wide margin of safety, and a prompt postoperative recovery.

However, both have disadvantages. Local anesthesia cannot be used routinely because of inability to control pain satisfactorily if the field is heavily scarred, as in extensive deforming burns. It is not satisfactory in long and extensive operations and it is of course one of the worst anesthetics for relieving apprehension. No matter how skillfully administered or successful in allaying pain, still the patient is always conscious, under considerable psychic strain and of course carries with him memories of the operation, which in turn promote fear of the operation to come.

Intubation of the patient for intratracheal anesthesia is in itself a disadvantage. While the technique is not difficult, still it is not entirely free from dangers, and means an extra step which is sometimes attended with considerable difficulty. This is particularly true if the patient has deformities which reduce the opening of the mouth or free movement of the jaw and neck. Although we have no figures to prove it, we are also of the opinion that intratracheal ether anesthesia is followed by a higher percentage of postoperative pulmonary complications than ordinary inhalation anesthesia. Moreover, ether in any form is one of the most unpleasant anesthetics from the standpoint of the patient. Although the disagreeableness of the induction may be diminished by using other agents, still there is always the postoperative reaction of nausea, retching, and vomiting, during which the patient is miserable. This factor alone is a deterrent to the use of intratracheal ether if the reconstruction must involve a number of operative steps, for after a time apprehension becomes so great that the patient may refuse to go through with the program.

During the past five years we have attempted to meet these conditions more satisfactorily by employing avertin as a basal anesthetic, supplemented in practically all instances by ether, in the correction of facial deformities. and in multiple stage procedures. We gradually gravitated to this solution of our anesthetic problem because of the

inherent difficulties in producing and maintaining a satisfactory anesthesia in instances where the operative field includes the mouth and nose. We have not been the first to recognize its usefulness for this purpose. In 1933 Pearse of our clinic called attention to its convenience for operations about the face,[9] and others have pointed out its advantages in ophthalmology[7] and in oral surgery.[5] We usually use avertin if the corrective procedure is to involve a considerable number of steps, even though the operative field is not about the face. We do this because it allays fear of subsequent procedures. If only one or two operative steps are contemplated we do not use avertin; unless the operative field is such that the nose and mouth cannot be excluded comfortably, or if the anesthetist and anesthetic apparatus will be a hindrance to the surgical team. We do not use avertin in children because we have found it unnecessary. In most patients up to 10 or 12 years of age a satisfactory anesthesia can be maintained by producing deep anesthesia during the induction period with drop ether, and then maintaining anesthesia during the operation by ether vapor given through intrapharyngeal tubes passed through either the nose or mouth. In some adults also this method will provide a useful anesthesia for relatively short operations. In brief, avertin plus intrapharyngeal ether is the anesthetic that we have come to use in adults for operations about the face, and for multiple stage procedures even when these do not involve the face.

Our experience has made us familiar with the advantages and faults of avertin, and we continue to use it, fully realizing that it is not ideal but serves us in certain patients perhaps better than any other anesthetic now available.

As you all know, avertin is one of the anesthetics added to our armamentarium in recent time. It was originally described by the chemists Willstaetter and Duisberg about fifteen years ago.[13] Avertin is the trade name for tribromethyl alcohol or tribromethanol, as it is usually referred to in the literature. As a chemical compound it is closely related to chloroform. In the commercial form avertin supposedly is made up of 1 gram of tribromethyl alcohol and ½ gram of amylene hydrate per 1 cc. of avertin fluid. The amylene hydrate fraction is a powerful hypnotic[2] and for this reason it is more accurate to refer to the mixture as avertin rather than tribromethanol.

You are all familiar with its pharmacological effects. The literature is replete with reports concerning almost every phase of its use concerning which one would care to inquire. In brief, from a variety of writers we believe the following are the salient facts: It is rapidly absorbed following rectal instillation—about 50 per cent within ten minutes.[11] The more rapid the instillation the sooner narcosis appears, but this causes an accentuation of the fall in blood pressure.[6] At least five minutes should be used for rectal instillation. There is a rapid rise of the concentration of the drug in the blood stream of from 6 to 9 milligrams per cent and this falls off until it is about 1 milligram per cent as the patient regains consciousness. This rapid detoxification of the two drugs occurs in the liver and the end products are excreted in the urine. As it is excreted in the form of glycuronates,[4] a positive test for sugar may be obtained in the urine which may be confusing in diabetics.

The action of the drug on the cardiovascular system is well known. A moderate fall in blood pressure occurs soon after administration, occasionally to an alarming extent. The respirations are depressed. Usually there is no ef-

fect upon the kidneys but occasionally transient albuminuria may be noted. Nephritis is a contraindication for this anesthetic. With large doses liver damage occurs and there have been some autopsy reports of central necrosis of the liver lobules even with moderate doses. This action on the liver is exactly similar to that of chloroform. Hepatitis, jaundice, and other biliary diseases are therefore definite contraindications to its use.

There have been many clinical reports of its use. It is notoriously difficult to determine whether a surgical death is due to the anesthetic, and this becomes, in the case of avertin, even more debatable since another anesthetic is ordinarily used as a supplement. In the literature one finds reports at both extremes. One recent report would have us believe that it is a more dangerous anesthetic than chloroform; giving the death rate as 1:500 or 1:1200,[2] while others report 5000 cases of avertin anesthesia without a death attributable to avertin.[8] A German clinical congress in 1928 decided that the avertin mortality was 1 in 7500.[1] In 1931 Schuberth after a critical study of reported avertin deaths concluded that the death rate was one in over 8000 cases.[10] From the literature one becomes convinced that in the early use of the drug the doses recommended and used were too large. The first users hoped that avertin would provide full anesthesia and to obtain this administered large doses which approached the lethal level. There were a number of deaths. Gradually the fact became evident that avertin could not be used safely in this way but in smaller doses was a relatively safe anesthetic which served a real purpose as a basal anesthetic. It would seem that this is now its established rôle in the anesthetic field and only rarely do we see reports advocating its use as the sole anesthetic.

It is in this manner that we have employed the drug in our work. At no time do we attempt to obtain full surgical anesthesia. It is always used as a basal anesthetic and in practically all instances supplementary anesthesia is necessary.

Our technique is, in the main, that with which you are all familiar. On the night before operation a cleansing enema is administered and the next morning ⅙ grain of morphine and 1/100 grain of atropine are administered one-half hour before the avertin. A larger dose of morphine is never administered because this drug, as well as avertin, is a respiratory depressant. A 2.5 per cent solution of avertin is made with distilled water heated to 104 degrees Fahrenheit, the solution tested with Congo red, and the exact dose carefully measured, and the rectal injection made slowly through a rubber catheter. A period of five to ten minutes is used for injection. During the injection, the blood pressure, pulse and respirations are watched carefully. We do not exceed the dosage of 100 milligrams per kilogram of body weight.

Following rectal instillation the patient is left in the induction room for twenty to thirty minutes so that narcosis may become complete before the patient is transferred to the operating table. Ether is then given by open mask until deep anesthesia is reached. Rubber catheters are then inserted into the pharynx through the nostrils, or if the operation is to be about the nose, an airway is inserted through the mouth and the tube carrying the ether vapor attached to this.

We have used this mode of anesthesia for about five years, and during this period we have had twenty-two patients who have been given avertin on two or more occasions. As far as we have been able to determine, the repeated use of avertin for the same patient has not been reported. Waters

administered repeated doses to dogs at intervals of three to five days until as high as twenty anesthesias had been given.[12] On postmortem examination of the animals, pathologic changes were noted in the liver, kidney, and spleen; which, however, were not of great severity and did not correspond to the central liver necrosis observed in chloroform poisoning. But as far as we know, data on repeated clinical doses is not available.

An analysis of the information accumulated in these twenty-two cases shows that the group has been given a total of 183 anesthesias, and in 114 of these avertin has been used as a basal supplement. In tabular form, the various anesthetics used were as follows:

TYPES OF ANESTHESIA USED IN REPEATED OPERATIONS ON 22 PATIENTS

No. of Patients	Avertin	GOE	Local	Cyclo-propane	Total Anes.
22	114	33	35	1	183

It will be seen that this is an average of approximately five avertin anesthetics per patient. From the selection of cases the smallest number of avertins per patient has been two and the greatest number (case No. 15) seventeen, given during the course of twenty-three operative steps taken in the restoration of a luetic loss of nose and lips.

In almost every instance the avertin basal anesthesia has been supplemented by ether through intrapharyngeal tubes.

SUPPLEMENTARY ANESTHETICS USED WITH AVERTIN

No. of Avertin Anesthesias	Ether Supplement	Nitrous Oxide Supplement	None
114	106	4	4

You will notice that we have not used avertin routinely even in this group of patients. When the field of operation is such that a closed system can be used, for example during the preliminary elevation of a neck-chest flap, we use nitrous oxide-ether. As the flap is transferred to the face, avertin-intrapharyngeal ether is used and toward the finish of the reconstruction, small trimming operations are usually done under local anesthesia.

As we have stated above, we do not believe that avertin should be used as the sole anesthetic. In three of the four instances in this series where it has been used in this manner, the patient had repeated recurrences of a carcinoma of the antrum, in which we wished to use the cautery. He was given 100 milligrams of avertin per kilogram of body weight, without complication. This produced a satisfactory anesthesia for a short operation with the cautery without danger of explosion. The other instance was a very short procedure about the orbit.

Nitrous oxide was used as a supplement on four occasions, twice by closed mask and twice by intratracheal balloon. The two anesthetics supplemented by closed mask nitrous oxide were in patients undergoing a long series of operations, in which the particular step was not about the face. The two intratracheal nitrous oxide supplements were in patients where the cautery was used in the removal of extensive carcinoma of the face requiring considerable time.

As will be seen from the above table, avertin was supplemented by intrapharyngeal ether in the main. In only eight cases out of the 114 was another supplement used.

The avertin dosage in this series has varied from a minimum of 40 milligrams to 100 milligrams per kilogram of body weight. The usual dose has been around 70 to 80 milligrams per kilogram of body weight, as shown below:

Doses in mg. per kilogram of body weight

	40	50	60	70	80	90	100	
No. Cases:	1	2	17	30	35	18	11	= 114

RESULTS

Narcosis has been obtained in 68 per cent of the cases. Thus in 32 per cent of the 114 anesthesias a partial narcosis was produced or none at all. However, on questioning the patients in these instances, we found that amnesia in each case was complete. Even though the patient may seem to be conscious and even answer questions rationally, there is a complete absence of any memory of this postoperatively.

Avertin Anesthesias	Complete Narcosis	Partial or No Narcosis	Amnesia
114	77=68%	37=32%	114=100%

The absence of narcosis did not necessarily occur in those instances where a small dose of avertin was used. A good example of this is in the case of a young man, 24 years of age, who was operated upon eight times, six of the anesthesias being avertin-intrapharyngeal ether. In five of these he received 100 milligrams of avertin per kilogram of body weight, and in three instances no narcosis was obtained and each anesthesia required a large supplement of ether.

We have had no unusual complications during the induction period. On a few occasions we have noted nausea and vomiting immediately after rectal instillation. This has occurred in five different patients toward the end of a course of avertin anesthesias. We know of no explanation of this. There is practically always a moderate fall in blood pressure within fifteen to twenty minutes after the rectal instillation, which returns to normal as ether is started. In this series there has been no initial blood pressure drop of an alarming nature. If narcosis is complete the ether administration is smooth, unaccompanied by excitement, struggling or coughing.

During operation the ether concentration must be maintained, otherwise toward the end of the procedure there may be coughing or retching. This is particularly so if the narcosis has been incomplete originally. Complications during operation have been of a minor nature and are as follows:

COMPLICATIONS DURING OPERATION

	None	Pulse Rise	B. P. Fall	Vomiting	Coughing
No. of Cases:	104	2	5	1	2

The one instance of vomiting and two of coughing occurred in patients in whom narcosis was not complete. Seven instances of a change in the cardiovascular status have been recorded irrespective of cause. Four of these occurred in one patient, a man of 63 with advanced arteriosclerosis, even though a rather small dose of 60 milligrams per kilogram was employed each time. Another occurred in a woman of 62 following a dose also of 60 milligrams per kilogram, although on another occasion with the same dose no fall in blood pressure was observed. The two instances of noticeable pulse rise were in young individuals where considerable blood had been lost.

The recovery period has been of about the usual length ordinarily reported following avertin administration. The shortest period has been fifteen minutes, while the longest time before consciousness was regained after completion of the operation has been five hours. This recovery period varies with the length of operation. In general, as we would expect from our knowledge of the excretion of the drug, the more time consumed in surgery, the shorter the recovery period. On the average, the patients in this group have been sufficiently conscious in about two hours so that a nurse was

no longer needed to maintain an adequate airway.

The interval between doses of avertin in the same patient has varied considerably. The shortest interval between consecutive avertin anesthesias in the same patient has been eight days and the longest nine months. During the course of accumulating these figures we paid no particular attention to the interval between avertin administrations, using this form of anesthesia when it was indicated and when the patient was ready for the next step. On averaging the time interval we found it to be 43½ days. This figure gives somewhat of a false impression since included in it are a few rather long intervals of four months or more. A more accurate impression is gained if we state that the majority of these repeated avertin anesthesias have been given about three to four weeks apart.

Time Interval between Consecutive Doses

	Shortest Interval	Longest Interval	Average Interval	Usual Interval
Days	8	258	43½	21-30 days

Postoperative complications have been completely lacking in this group of 106 avertin anesthesias. There have been no respiratory infections. The urine has been examined routinely after operation and no evidence noticed of kidney irritation. There has been no instance of albuminuria. In three instances, all in the same patient, a positive test showed acetone in the urine. This is in accordance with previous reports of avertin causing acidosis occasionally. Clinically, there has been no evidence of liver damage in any of these sixteen patients, although no special tests have been done to determine subclinical evidence of this. It seems to us that this point is well worth emphasizing since avertin is so closely related to chloroform and its toxic action on the liver is supposedly of the same nature. Instances of rectal irritation have been reported following avertin anesthesia, but none have occurred in this series. Postoperative nausea and vomiting have been recorded in twenty-three of the 114 avertin anesthesias, or 20 per cent. This we consider a rather low incidence when we remember that practically all of the patients had ether as a supplement.

SUMMARY

We have used avertin as a basal anesthesia during the past five years in reconstructive surgery of the face. During this time we have had twenty-two patients who have been given avertin in doses of from 40 to 100 milligrams per kilogram, on two or more occasions. A total of 183 anesthesias has been administered in this group, of which 114 have been avertin, or an average of about five avertin administrations per patient. In practically all instances the avertin has been supplemented by intrapharyngeal ether. The average interval between avertin administrations has been 43½ days.

This has proved to be a satisfactory anesthesia for reconstructive surgery about the face. It allows the surgeon unhampered access to the operative field, and prevents undue apprehension on the part of the patient, which is of considerable importance in multiple stage reconstructions.

There have been no complications during or following operation in this group of patients. In 80 per cent of the anesthesias there was no nausea or vomiting postoperatively. Thirty-two per cent of the patients have had incomplete narcosis but 100 per cent of the avertin administrations have been attended by complete amnesia.

Repeated Avertin Anesthesia

	Record Data	Age Sex	Diagnosis	Total No. Anesthesias	No. of Local	No. of G.O.E.	No. of Avertin	Average Dosage Mgs. per kilo.	cc.	Narcosis	Interval Between Avertins	Supplement	Duration of Anesthesia	Duration of Recovery period	Complications During op.	Complications Post-op.	Remarks
1	A. B. No. 138274	M 60	Carcinoma Antrum	3	0	0	3	100	8.6	Complete	— 17 days	None	1'25"	1'20"	None	None	Moved when cautery used.
								90	7.5	Complete	— 22 days	None	2'15"	2'20"	None	None	
								100	8.4	Complete		None	55"	2'30"	None	None	
2	I. C. No. 125957	M 20	Congenital absence, ears	12	2	5	5	70	4.	Incomplete	— 34 days	Ether	2'30"	5'	None	Vomiting	Deafness may account for long recovery. Vomited during instillation of 4th avertin.
								40	2.2	Incomplete	—180 days	Ether	3'5"	4'	None	None	
								70	4.4	Complete	— 49 days	Ether	2'5"	2'40"	None	None	
								60	3.8	Complete	— 41 days	Ether	1'55"	2'20"	None	None	
								70	4.2	Incomplete		Ether	1'20"	3'	None	Vomiting	
3	H. T. No. 128574	F 16	Burn Contracture Neck	6	1	3	2	50	3.	Incomplete	— 95 days	Ether	3'5"	1'40"	None	Vomiting	None
								80	4.9	Complete			1'55"	2'	None	None	
4	D. S. No. 122927	F 22	Congenital Deformity of nose	4	0	1	3	90	5.1	Complete	— 50 days	Ether	2'35"	1'40"	None	Vomiting	None
								90	5.2	Complete	—220 days	Ether	2'00"	4' 5"	None	None	
								60	3.4	Complete		Ether	2' 5"	20"	None	None	
5	A. G. No. 112902	F 17	Extensive radium burns—face	13	3	3	7	90	5.	Incomplete	— 26 days	Ether	3'10"	4'40"	None	None	Rise in pulse
								90	5.5	Complete	— 43 days	Ether	3'30"	2'50"	None	None	
								90	5.5	Complete	— 85 days	Ether	2'15"	4'00"	None	None	
								90	5.8	Complete	— 80 days	Ether	2'25"	1'50"	None	None	
								90	6.5	Complete	—120 days	Ether	1' 0"	3'00"	None	None	
								90	5.7	Incomplete	—180 days	Ether	3' 5"	3'00"	None	None	
								70	4.8	Incomplete		Ether	1'30"	1'30"	None	None	
6	R. B. No. 110047	M 18	Post Traumatic Deformities of face	7	3	0	4	80	5.3	Complete	—108 days	Ether	4'00"	15"	None	None	Suction for aspiration blood
								90	6.	Incomplete	—240 days	Ether	3' 5"	2'20"	Cyanosis	None	
								100	6.4	Complete	— 26 days	Ether	2'10"	1'15"	None	None	
								80	5.	Incomplete		Ether	1'35"	1'40"	None	None	
7	R. H. No. 54898	M 17	Congenital Deformities of face post hare-lip	9	1	2	6	80	5.	Complete	— 83 days	Ether	2' 5"	3' 5"	None	Vomiting	On last 2 avertin anesthesias became nauseated on rectal instillation
								80	5.2	Incomplete	— 28 days	Ether	2'50"	2'	None	Vomiting	
								100	6.2	Complete	— 17 days	Ether	1'30"	2'30"	None	Vomiting	
								100	6.3	Complete	— 50 days	Ether	2'00"	4'	None	None	
								90	5.9	None	— 38 days	Ether	2'30"	2'	Vomiting	None	
								90	6.1	Complete		Ether	1'40"	3'	None	Tremor	

Repeated Avertin Anesthesia (continued)

Record Data	Age Sex	Diagnosis	Total No. Anesthesias	No. of Local	No. of G.O.E.	No. of Avertin	Average Dosage Mgs. per kilo.	Average Dosage cc.	Narcosis	Interval Between Avertins	Supplement	Duration of Anesthesia	Duration of Recovery period	Complications During op.	Complications Post-op.	Remarks
8 D. C. No. 123142	M 24	Post traumatic deformities of face	4	0	2	2	80 85	5.9 6.	Complete Complete	—130 days	Ether Ether	2′45″ 1′40″	2′50″ 1′35″	None None	None None	
9 R. K. No. 34182	M 26	Post traumatic deformities of face	5	0	2	3	80 80 80	4.6 4.6 4.7	Complete Complete Complete	— 61 days — 49 days	Ether Ether Ether	1′45″ 2′55″ 1′50″	2′40″ 3′30″ 2′20″	None None None	None Vomiting Vomiting	
10 J. K. No. 147720	M 19	Post traumatic deformities of face	4	0	0	4	90 70 70 90	5.4 4.4 4.3 5.6	Complete Incomplete Incomplete Incomplete	— 38 days — 28 days — 13 days	Ether Ether Ether Ether	2′ 5″ 1′10″ 2′ 1′40″	3′ 1′50″ 3′20″ 4′5 ″	None None None None	Vomiting None None None	
11 C. H. No. 129113	F 16	Burn contractures of face and neck	12	2	2	8	70 80 100 70 80 80 80 80	3.6 4.2 5.4 3.6 4.2 4.4 4.4 4.5	Complete Complete Complete Partial Complete Complete Complete Complete	—258 days — 39 days — 88 days — 20 days —112 days — 62 days — 54 days	Ether Ether GO Ether Ether Ether Ether Ether	1′50″ 2′20″ 1′30″ 2′5 ″ 3′35″ 2′15″ 3′5 ″ 3′20″	2′30″ 2′20″ 1′20″ 1′30″ 2′50″ 3′30″ 4′ 3′20″	None None None None None None None None	None None None None Vomiting None Vomiting None	Mucous colitis between 3d and 4th avertin
12 F. N. No. 40290	M 63	Basal cell ca. rt. internal canthus	6	1	0	5	60 60 60 60 60	3.4 3.5 3.4 3.4 3.3	Partial Partial Complete Complete Complete	— 14 days — 36 days — 34 days — 47 days	Ether Ether Ether Ether Ether	1′35″ 1′30″ 1′45″ 2′10″ 1′35″	2′45″ 55″ 1′10″ 1′40″ 1′	BP drop None None BP drop Irregular pulse	None None None None None	Arteriosclerotic heart disease and pulmonary fibrosis
13 W. E. No. 126020	M 63	Carcinoma of jaw	6	1	2	3	70 60 80	5.3 4.5 5.6	Complete Complete Complete	— 23 days —182 days	Ether Ether Ether	3′30″ 2′5 ″ 2′5 ″	1′30″ 1′ 50″	None None None	None None None	
14 L. C. No. 92794	F 29	Traumatic deformities of face	2	0	0	2	70 90	4.1 5.4	Complete Complete	— 74 days	Ether None	1′25″ 55″	1′ 1′30″	None None	None None	Second op. no supplement needed

Repeated Avertin Anesthesia (continued)

Record Data	Age Sex	Diagnosis	Total No. Anesthesias	No. of Local	No. of G.O.E.	No. of Avertin	Average Dosage Mgs. per kilo.	Average Dosage cc.	Narcosis	Interval Between Avertins	Supplement	Duration of Anesthesia	Duration of Recovery period	Complications During op.	Complications Post-op.	Remarks
15 E. F. No. 127110	F 48	Luetic ulceration face and jaws	24	5	2	17	70	3.7	Complete	— 50 days	Ether	2'35"	2'00"	None	None	
							60	3.2	Complete	— 57 days	Ether	2'25"	1'00"	None	None	
							60	3.0	Complete	— 23 days	Ether	2'20"	2'20"	None	Nausea	
							70	3.5	Complete	— 40 days	Ether	2'20"	1'40"	None	None	
							60	2.9	Incomplete	— 30 days	Ether	2'25"	1'40"	None	Vomiting	
							70	3.1	Incomplete	— 39 days	Ether	1'45"	1'00"	None	None	
							60	3.0	Complete	— 35 days	Ether	2'20"	1'10"	None	None	
							70	3.5	Complete	— 14 days	Ether	2'05"	1'00"	None	None	
							80	3.9	Complete	— 19 days	Ether	1'40"	1'00"	None	None	Vomited on rectal instillation
							70	3.3	Incomplete	— 25 days	Ether	1'55"	1'35"	None	None	
							70	3.5	Incomplete	— 74 days	Ether	1'25"	1'50"	None	None	
							70	3.5	Incomplete	— 55 days	Ether	1'55"	30"	None	None	
							80	4.	Incomplete	— 10 days	Ether	1'25"	30"	None	Vomiting	Acetone in urine on three occasions postop.
							70	3.5	Complete	— 88 days	Ether	1'50"	30"	None	None	
							80	4.	Complete	— 43 days	Ether	2'40"	1'05"	None	None	
							70	3.5	Incomplete	— 45 days	Ether	1'20"	1'20"	None	None	
							80	4.1	Complete		Ether	1'30"	2'20"	None	None	
16 D. S. No. 67597	M 68	Recurrent Ca. nose and diabetes	4	1	0	3	90	4.5	Complete	— 41 days	Ether	2'10"	2'10"	None	None	
							60	3.1	Complete	— 51 days	Ether	2'00"	2'50"	None	None	
							50	2.7	Complete		Ether	1'15"	50"	None	None	
17 D. M. No. 102056	M 60	Recurrent Ca. nose-Lues	7	2	1	4	80	6.8	Complete	— 88 days	Ether	1'00"	1'40"	BP drop	None	
							80	6.8	Complete	— 21 days	Ether	2'30"	1'35"	None	None	
							80	6.8	Complete	— 92 days	Ether	1'50"	1'20"	None	None	
							70	6.2	Complete		Ether	1'05"	1'05"	None	None	
18 J. H. No. 55068	M 20	Traumatic loss of nose	8	1	1	6	90	4.3	Complete	— 41 days	Ether	2'30"	4'20"	None	Vomiting	Long recovery periods -Vomited during instillation -Alb. 1+ in urine preop.
							80	3.9	Complete	— 25 days	Ether	2'25"	3'00"	None	Vomiting	
							70	3.4	Complete	— 38 days	Ether	2'35"	3'20"	None	Vomiting	
							80	3.8	Complete	— 65 days	Ether	1'45"	3'10"	None	Vomiting	
							80	3.8	Complete	— 84 days	Ether	1'10"	2'40"	None	None	
							90	4.5	Complete		Ether	1'45"	3'40"	None	Nausea	

Repeated Avertin Anesthesia (concluded)

Record Data	Age Sex	Diagnosis	Total No. Anesthesias	No. of Local	No. of G.O.E.	No. of Avertin	Average Dosage Mgs. per kilo.	Average Dosage cc.	Narcosis	Interval Between Avertins	Supplement	Duration of Anesthesia	Duration of Recovery period	Complications During op.	Complications Post-op.	Remarks
19 E. H. No. 91783	F 62	Recurrent Ca. Forehead	4		2	2	60	2.8	Complete	— 91 days	Ether	1'15"	1'50"	None	None	Required very small amt. of supplement
							60	2.8	Complete		Ether	3'10"	3'00"	BP drop	Vomiting	
20 C. K. No. 143166	M 30	Extensive Burn Contractures face and hands	20	7	2 *	11	70	5.5	Incomplete	—11 days	GOE-Ether	3'05"	50"	Coughing	None	High percentage of ether used in all supplements
							70	5.5	Incomplete	— 15 days	Ether	2'10"	1'40"	Coughing	Vomiting	
							70	5.6	Incomplete	— 31 days	Ether	2'05"	1'50"	None	None	
							80	6.5	Complete	—110 days	GOE	2'50"	2'20"	None	None	
							70	6.3	Incomplete	— 20 days	Ether	1'30"	1'45"	None	None	
							75	7.2	Complete	— 54 days	Ether	2'30"	1'40"	Coughing	None	
							60	5.5	Incomplete	— 28 days	Ether	4'10"	2'20"	BP drp	Vomiting	
							80	7.0	Incomplete	— 25 days	Ether	2'45"	2'10"	None	None	
							80	7.1	Complete	—118 days	Ether	2'10"	2'00"	None	Vomiting	
							60	5.9	Incomplete	— 21 days	Ether	2'10"	2'05"	None	None	
							70	6.6	Complete		Ether	2'50"	50"	None	None	Nauseated during instillation
21. P. B. No. 100645	M 26	Facial Palsy	8	1	1	6	80	4.4	Incomplete	— 33 days	Ether	3'00"	3'20"	None	Vomiting	Large amounts of ether necessary. (Due to alcoholism?)
							100	5.5	Incomplete	— 98 days	Ether	1'00"	1'30"	Excessive mucous	None	
							100	5.6	Complete	—108 days	Ether	1'35"	3'30"	None	None	
							100	5.7	Complete	—134 days	Ether	1'55"	2'30"	None	None	
							100	5.8	Incomplete	—135 days	Ether	2'30"	2'00"	None	None	
							100	5.4	Incomplete		Ether	1'10"	2'30"	None	None	
22 W. B. No. 80435	M 47	Ca. defect right cheek	15	4	3	8	70	5.6	Complete	— 20 days	Ether	4'00"	1'00"	None	None	
							70	5.6	Complete	— 49 days	Ether	2'00"	awoke	None	None	
							80	6.0	Incomplete	— 8 days	Ether	2'00"	1'20"	None	None	
							80	6.0	Complete	—174 days	Ether	1'40"	1'20"	None	None	
							80	6.4	Complete	— 18 days	Ether	2'00"	1'00"	None	None	
							80	6.4	Complete	— 17 days	GO	1'30"	2'00"	None	None	
							70	5.3	Complete	— 27 days	GO	1'05"	1'10"	None	None	
							80	6.2	Incomplete		Ether	2'00"	2'20"	None	None	

* (1) cycle

REFERENCES

1. Avertin Aussprache (Northwest German Surgical Society), December 14, 1928. Zentralbl. f. Chir., 56: 995, 1929.
2. Beecher, Henry K.
   Fatal Toxic Reactions Associated with Tribromethanol Anesthesia. J.A.M.A., 111: 122, 1937.
3. Cushny, A. R.
   Pharmacology and Therapeutics. Lea & Febiger, New York, 1918.
4. Endoh, C.
   Ueber das Verhalten des Tribromathyl Alkohols in Tierkorper. Biochem. Zeitschr., 152: 276, 24.
5. Fenelly, W. A.
   Avertin in the Reduction of Fractured Facial Bones. Jour. of Am. Dent. Asso., 24: 1089, 1937.
6. Kennedy, W. P.
   The Blood Pressure in Avertin Anesthesia. Brit. Jour. Anaesth., 8: 52, 31.
7. Laval, Joseph
   Avertin Anesthesia for Ophthalmic Operations. Arch. of Ophth., 19: 714, 1938.
8. Mueller, L. B.
   A Report of 5000 Avertin Administrations from the Dept. of Anesthesia, Methodist Hospital, Indianapolis, Indiana. Anesth. and Analg., 16: 36, 37.
9. Pearse, H. E., and Wiedrich, Marjory M.
   "Avertin" Anesthesia. N. Y. State Jour. Med., 33: 385, 1933.
10. Schuberth, O.
    Deaths Caused by Avertin Narcosis. Acta. Chir., Scand., 68: 55, 1931.
11. Straub, W.
    Rektalnarkose mit Avertin. Munchen. med. Wchnsch., 75: 593, 1279, 1928.
12. Waters, R. M., and Muehlberger, C. W.
    Tribromethanol Anesthesia. Arch. Surg., 21: 887, 1930.
13. Willstaetter, R., and Duisberg, W.
    Zur Kenntnis des Trichlor- und Tribromathyl-Alkohols. Ber. der Deutsch. Chem. Gesellsch., 56: 2283, 1923.

ANESTHESIA IN RECONSTRUCTIVE AND PLASTIC SURGERY

REGINA NOON

Anesthetist to Dr. V. P. Blair and Dr. J. B. Brown, St. Louis, Mo.

Introduction The purpose of this paper is to present the problems that are encountered by the surgeon and the anesthetist in operative procedures about the head and neck. The principles of anesthesia involved are no different from those in other branches of surgery, but the method of administration of necessity requires special procedures and equipment. The anesthetist must not hinder the surgeon with equipment but at the same time must have adequate freedom of action and control of the anesthesia to insure the safety of the patient. To fulfill these requirements the following problems must be solved:

Read at the eighth annual meeting of the American Association of Nurse Anesthetists, September 16-19, 1940, Boston, Mass.

1. Administration of the anesthetic to infants, such as is required in the repair of harelip and cleft palate.

2. Arrangement of apparatus to allow change in the patient's position without necessitating redraping.

3. Prevention of airway obstruction due to blood and mucus, in surgery involving the oral and nasal cavities.

4. Prevention of distortion of features by the equipment.

5. Adaptation of methods in deformities of the mandible and those due to ankylosis of the temporomandibular joints.

I wish to present the routine that is followed by the Reconstructive and Plastic Surgical Service at Barnes Hospital, St. Louis, Mo.

Drugs used for premedication are given in comparatively small doses. Infants usually are given no premedication; older children atropine only; while the average adult receives ⅙ grain of morphine and 1/150 grain of atropine. Our objection to the use of large doses of preanesthetic drugs is their irreversibility; once administered they cannot be withdrawn. Only enough should be given to relax the patient and allow easy induction. It is most desirable that these patients react rather quickly following operation. There is no objection to the use of avertin where abnormality of the jaws or other parts of the upper respiratory system does not exist. However, in elderly patients, or when the operative procedure may embarrass the respiration, it should be avoided. Avertin is not employed when it is felt that the patient's reaction to this drug might be prolonged.

Primary harelip repairs preferably are performed early, often within the first twenty-four hours after birth. Occasionally a barbiturate is given as premedication, although no standard dose has been established. As in adults, the infra-orbital nerves are blocked, using 2 per cent novocain, containing adrenalin in a 1/40,000 solution. The adrenalin, while holding the anesthetic in situ, also minimizes bleeding. The operative procedure may disturb the infant, but the patient can be controlled readily by a small amount of ether vapor.

As a rule, if a local anesthetic is not used, no premedication is given. The infant is anesthetized with drop ether, following which ether vapor is directed over the nose and mouth by means of a metal tube which is somewhat the shape of an ordinary glass drinking tube but longer and larger in caliber. Anesthesia is maintained in a light zone, just deep enough to keep the baby quiet. The method is in contradistinction to the ideas of some surgeons who believe that the work should be performed under deep anesthesia.

Ordinarily, the surgeon sits at the head of the patient and the anesthetist at the side. If respiratory difficulty occurs, a suture is placed in the tongue and held by the anesthetist. The moderate traction on the tongue makes use of the suction in the throat less difficult for the first assistant surgeon. Such a procedure permits a great deal of ether vapor to be dissipated into the air and the operator may receive an objectionable amount. However, this method has proved safe and has been used in all our cases without a fatality (Fig. 1).

Primary cleft palate repairs are seldom performed on patients under one year of age. The patient is anesthetized with nitrous oxide and ether vapor, or drop ether. A single open-end nasal catheter, of as large a caliber as the nostril will accommodate, is then inserted. Caution must be exercised to prevent the end of the catheter from protruding beyond the posterior border of the palate. If inserted too far there is danger of building up pressure sufficient to cause abdominal distention, which may result in a rupture of the intestinal tract.

The depth of anesthesia, as well as the rate and depth of respiration, may

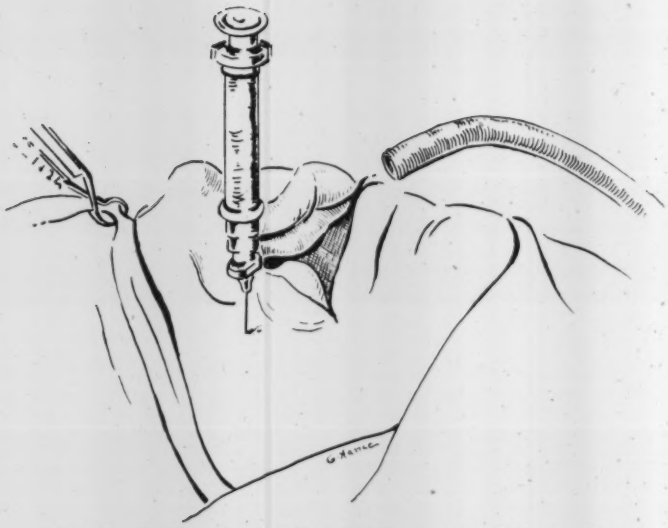


Fig. 1. Patient draped for harelip repair. Metal tube directing flow of ether vapor, and syringe and needle to block the infraorbital nerves.

be gauged by placing a hand upon the patient's chest. At the same time the hand may be moved downward onto the abdomen so that one may detect the first signs of beginning abdominal distention.

Tongue sutures and metal tongue depressors are used for all palate repairs to aid in exposure of the operative field and to help in maintaining an open airway. However, if the tongue depressor is allowed to slip too

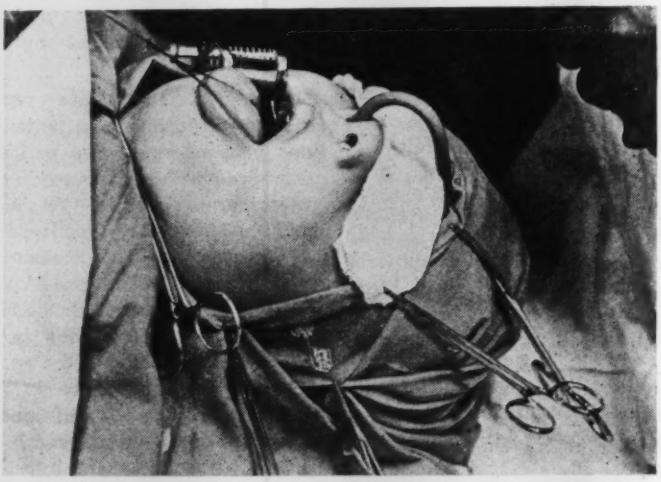


Fig. 2. Patient draped for cleft palate repair with intranasal catheter in place for insufflation anesthesia.

far back it may block the passage mechanically.

The surgeon sits at the head of the table with the patient's head and neck well extended. This position at times may interfere with a free airway and it is frequently necessary for the anesthetist to call this to the attention of the surgeon. The anesthetist must at times also suggest suction of collected blood and secretions from the throat.

To prevent aspiration of blood following operations involving the nasal and oral cavities, the patient is immediately placed in the prone position with the face turned to the side. This position is maintained until the patient is fully conscious and the danger of hemorrhage is past. Tongue sutures may then be removed (Fig. 2).

Intratracheal anesthesia is employed in the majority of head and neck operations for patients over two and one-half years of age. We feel that the danger of trauma to the delicate membranes of the throat and vocal cords in younger patients is too great to warrant the use of this technique. Intratracheal insufflation was the first method used and has certain advantages in that the equipment is simple. A small hard fiber catheter is intubated through the mouth and into the trachea. The return flow of air, although keeping the trachea more or less free of blood, at times obscures the operative field and makes asepsis extremely difficult to maintain.

The Magill tube and carbon dioxide absorption technique have brought about a revolutionary change in methods. The system, being entirely closed, represents an extension of the patient's respiratory tract; thus the anesthetic is more readily controlled and the danger of contamination is reduced to a minimum.

Regardless of the agent employed, the success or failure of the inhalation method of intratracheal anesthesia for plastic surgery depends upon the integrity of the connections between the catheter and the delivery tubes. These connections must be of proper length and caliber so as not to add resistance to breathing, and they must fit together securely so as not to become disconnected with movements of the head. All of the many connections made in the last few years which we

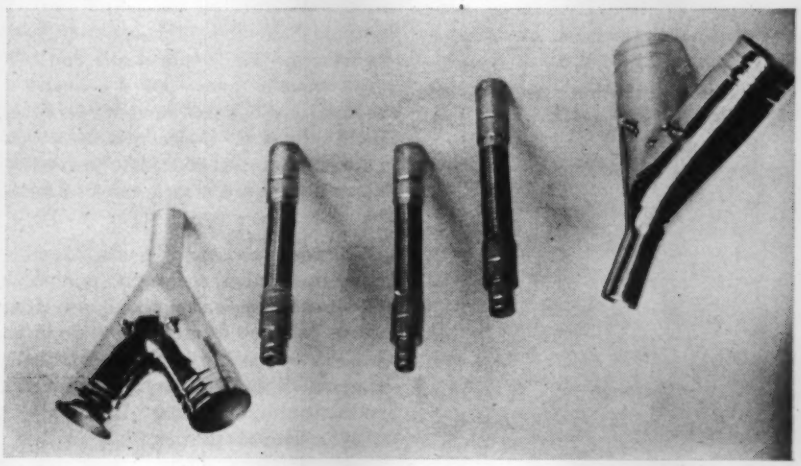


Fig. 3. Spring connections and Y-connections.

have tried have been found deficient for the type of work requiring more than ordinary movements of the patient's head. This difficulty has been overcome by the use of a short, flexible spring connection which is made of monel stainless steel wire and has an adapter at each end. One adapter fits the caliber of the catheter, while the other fits into the Y-connection on the delivery tube. Latex or thin-walled rubber tubing is slipped over the spring and tied in place with heavy silk suture. This forms a universal joint which may be turned in any direction without obstructing the lumen of the tube. The first model was developed by Dr. J. B. Brown and myself and we feel that it circumvents the difficulties encountered with the older type of connection (Fig. 3).

Magill tubes may be obtained in sizes from No. 4 to No. 7 or No. 22 to No. 30 French gauge. Size No. 6 is the one most commonly used for adults. Size No. 4 may be used for children from three to four years of age if the nares are large enough to accommodate the tube with ease. To eliminate the inconvenience of adjusting the tubes and connections before using, each tube should have an individual connection. These may be washed and sterilized as a unit.

For blind intubation through the nose, the patient need not be completely relaxed so long as the respirations are regular and of good volume. Sterile tubes lubricated with vaseline are used (Fig. 4-A). The tube is slipped along the floor of the nasal cavity into the pharynx until the point is reached where the respiratory sounds are heard with the maximum intensity, and the tube is then inserted into the trachea during inspiration. If the tube passes into the esophagus, the breath sounds are absent. The tube is withdrawn and the head turned slightly to right or left until the breath sounds are again heard and the procedure is repeated. If blind intubation is unsuccessful, the laryngoscope is used so that the end of the tube can be grasped with Magill forceps and inserted into the trachea during inspiration. After the connection is made to the delivery tube, a mouth gag is inserted, and moist gauze is packed firmly about the tube in the pharynx. The gauze pack prevents the escape of the anesthetic mixture and also keeps the blood and secretions from seeping into the trachea and esophagus. These packs are removed just before the catheter is extubated and suction is used at this time to prevent aspiration of blood and mucus. With the gauze pack an inflatable balloon on the catheter is unnecessary. The connections and tubes are brought over the forehead and secured by a head band made of two inch adhesive, under which a small rubber sponge is placed to prevent excessive pressure which may be caused by the Y-connection (Fig. 4-B).

Fig. 4-A. Table set-up for indirect intratracheal intubation.

A particularly difficult anesthetic problem is encountered if the mandible is deformed or ankylosed. Many times these two conditions occur simultaneously, the point of the symphysis of the mandible lying almost in contact with the hyoid bone. Generally an obstruction of the airway occurs in these patients during the induction of anesthesia. Since it is impossible to

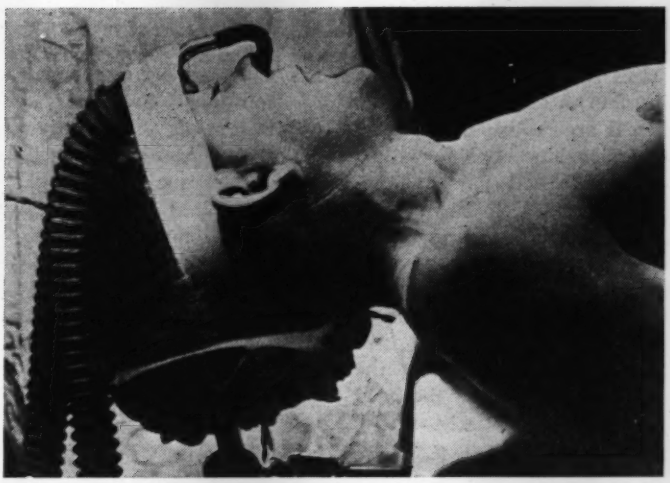


Fig. 4-B. Showing the Magill catheter and connections in place.

insert an airway through the mouth, a short Magill tube with a safety pin at the outer end may be slipped into the nostril. This should reach a point below the tongue block and just above the glottis, where the maximum breath sounds are heard. The anesthetic is then continued until the patient is sufficiently anesthetized to permit intubation with a regular Magill tube. If intratracheal intubation cannot be accomplished, the insufflation method must be resorted to, using the intranasal catheter. For patients in which a complete obstruction occurs, a tracheotomy must be done. However, in our series of cases this has not been necessary.

In patients requiring pressure dressings about the neck and mandible or in those where jaws have been wired together, the utilization of the short Magill tube as a nasal airway may be lifesaving during the period of recovery. To illustrate its value, we had a case where such a tube was left in place seven days postoperatively, thereby avoiding the necessity of a tracheotomy. To prevent aspiration of vomitus or blood, a suction is kept at the patient's bedside for use through the tube. The use of suction, or movements of the head, may displace or block the tube and the anesthetist may be required to assist in its readjustment.

The Magill tube intubated through the mouth has the disadvantage of becoming kinked when slightly displaced. The hard fiber catheter used for inhalation anesthesia is unwieldy, therefore the Foregger latex wire-

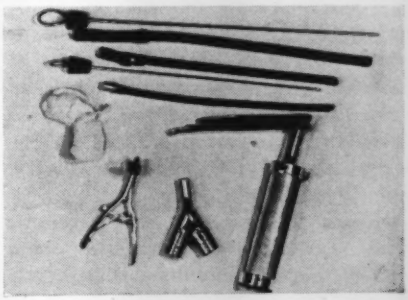


Fig. 5-A. Table set-up for direct intratracheal intubation.

embedded catheters have a distinct advantage in that they are flexible and will not collapse. These may be obtained in sizes No. 12 to No. 40 French gauge (Fig. 5-A).

Intubation is accomplished by means of a direct vision laryngoscope with a stylet through the catheter as a director. The jaw and throat muscles should be relaxed. The spring connection and the moist pack are used as in the indirect intubation method. The catheter and connection are held in place on the neck with one inch adhesive tape. The flexibility of the catheter and connection allow the head to be turned or the neck extended as the surgeon desires (Fig. 5-B).

The more explosive anesthetic agents are not used because of the presence of multiple electrical applicances. Chloroform is employed when the operative procedure necessitates the use of the actual cautery. The patient is anesthetized in the usual way, an intranasal catheter inserted, and chloroform vapor insufflated, using the Junker bottle. If the cautery is necessary after the intratracheal catheter is already in place, the ether is removed from the anesthetic mixture and chloroform is substituted.

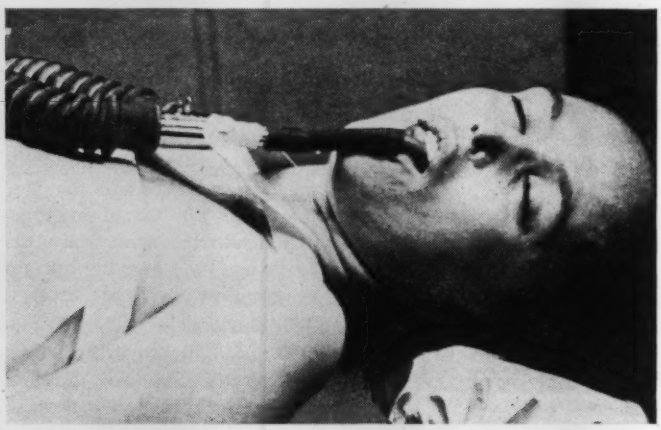


Fig. 5-B. Showing the Foregger latex wire-imbedded catheter and connections in place.

BUILDING ESPRIT DE CORPS

JAMES A. HAMILTON
Director, New Haven Hospital, New Haven, Connecticut

Read at the eighth annual meeting of the American Association of Nurse Anesthetists, held in Boston, Mass., September 16-19, 1940.

Napoleon Bonaparte once said that of the total value of the elements that go to make up battle efficiency: numbers, arms, training and morale, *seventy-five* per cent is morale. In all the forms of organized human activity, and during all the ages, the great leaders have recognized the importance of morale. They have learned from practical experience that loyalty, initiative and enthusiasm are associated in some intangible way, and yet in a real way, with this thing that we call the spirit of the organization.

These effects are attributes of good organization, of course. They are also reflections of the rank and file of the people who make up the organization. Individual and group attitudes depend upon that mental condition of an organization that we presume to call morale. How might one proceed to foster good esprit' de corps or morale? What about this relationship between the executive leadership—and many of you are leaders in the sense that you are department heads—and the labor relation problems that you may have in terms of your subordinates?

Good organization morale may be defined as a mental condition of the organization under which individuals and groups make a temporary and reasonable subordination of their personal interests, willingly, that the interests of the organization may be advanced. Notice that they make a reasonable subordination of their personal interests, willingly, that the group interests may be advanced.

Now, this mental condition of the organization may exist in a great many degrees, varying from the extreme positive that I have just mentioned to the extreme negative. The definition, of course, assumes the highly positive position. Because of its intangible nature, however, it may change from its existing condition so gradually that we are not quite conscious of any degree of change and do not become aware of it.

Notice that I said, "a temporary and reasonable subordination." I did not mean a permanent sacrifice of any legitimate interest. I did not mean that individuals or groups are willing to make that temporary subordination unless they have positive, reasonable assurance that at some future time they will not only regain what they are losing, but perhaps may secure an even greater return for the substituted values for this thing which they are giving up.

Management must supply these values. There is no question about that. Management must supply these values at some reasonable time in the future. I am talking about good wages, reasonable hours, satisfactory working conditions, and anything else that has an immediate effect on the individual's desires. Therefore, if we are going to talk about any practical doctrine of this type, we must recognize that the doctrine of intelligent selfishness enters into it. In other words, both upon the part of the employee and the part of management, intelligently and selfishly they arrive at the situation in anticipation of some resulting attitudes.

The basic process might be called an integration of various interests.

In other words, there must be a realization upon the part of the people taking part that the activities of the management and the activities of the individuals mesh sufficiently closely so that they become mutual interests.

Let us examine these interests from the point of the objectives that we are after. First of all, I should like to talk about service; in other words, the value of the service that we supply to the community, and its significance to that community, as well as to the individual involved. Here we consider the total objective of the whole organization, namely, a hospital. Of course, these objectives must have a distinct effect upon the attitude you take as one unit in that total organization. In other words, do you feel that through your efforts you share in a service venture that affects the whole commuity and its return to the individuals in that community?

I would then centralize upon personal objectives. In other words, is there any benefit to us as anesthetists from this hospital organization and from our association with it? Are we going to get personal returns from this sort of thing: personal objectives, such as better salaries, wages or hours, higher professional ranking, or whatnot?

Then I would say there is a whole group of collateral interests or objectives. We know that in a hospital, for example, there are such elements as the patient, the medical profession, the general public and the employees, that are all involved. Once you get any one of these elements out of balance, then comes the trouble from the point of view of morale building. To be concrete, once you allow, let us say, all of the activities of the Anesthesia Department to be built entirely upon the desires and wishes of the professional staff, then perhaps the patient may suffer. Or, to come to a point that might be disagreeable to you, once an anesthetist becomes imbued with the necessity of professional recognition, we may forget a little bit about the patient or the medical staff.

Sometimes I feel that way. Each of us as part of this organization wishes to have membership in a national organization that has high professional standards. We wish to have some place in the sun. That is quite proper and progressive, but we must not lose sight of the fact that that place must be earned and not merely demanded. We must show by our activity and results what people should think of our profession and standards, rather than to say that this is so and must be so because our national organization says so, irrespective of how that affects anybody else.

Then, what I am talking about is the meshing of individuals with these varying objectives of service, personal relations and these correlating things. We must find a way of meshing these together, in order that we might get an integration of interests and in order that we might have good morale.

Please bear in mind that I am not trying to tell you what your job should be; that is the farthest thought from my mind. I do not know, as well as you do, how to apply many things to your work. But, the processes about which I would like to talk with you must go across these various interests that I have mentioned without emphasizing any one unnecessarily. Let me review for you my philosophy as it applies to personnel relations. Some of you may have read some of the things I have written about it. I shall try to mention the points briefly so as not to bore you by too much repetition.

First of all, I believe that *personnel problems arise because we are human beings*. Therefore, if we are going to

approach these problems, we must recognize that fact. That means that each of us is different from everyone else. The things we may have in mind, our subordinate may not have in mind, because he is different. He is not the same individual. Also, we are not the same individuals tomorrow, or yesterday. Maybe we didn't get up early enough this morning; maybe we did not like the way the doctor spoke to us. Therefore, our next contact with our associate or subordinate is strained and different from what it might have been yesterday. Unless we recognize that fact, we cannot possibly solve the personnel problem.

Also, in your communities, I believe that *social prestige varies in direct relationship to the social ranking of the position that we have, irrespective of salary.* In other words, I think there is greater emphasis on the social status of our jobs than about any particular return in terms of financial reward. To those of us who have become managers in any sense, we are sure that is true. Of course, we want all the money we can get, but we know that we have our particular jobs because of other reasons. Somehow we do not think our subordinates have that feeling at all. We feel that they do not mind any of these other things, or that all they think about is salary and wages and hours, and things of that sort. For example, a hospital superintendent, a college president and a bank president can all get together socially for a great many things. Their salaries may be different in size; yet, they feel within their own field an equal ranking in social status. That is equally true in a field such as anesthesia, whether one is an anesthetist in a great big hospital, or an anesthetist in a small hospital; they still would have the same social ranking in their respective places.

Then, too, *workers are much more sensitive to a change in that social status than they are in the adjustment of salaries.* If you do not believe that, just try to change the title of a "chief anesthetist" to "anesthetist" and see what happens. You may not adjust her salary a bit. You may even give her a raise. Yet, she will come in tomorrow and want to know why that change was made. Anyone who makes annual reports for hospitals and prints them, and by any chance gets someone in the wrong place, will find a considerable disturbance; more so than if somebody gets two dollars a month more in wages.

I remember going through a hospital in California with the Superintendent. We got to the dietary kitchen, and I saw a young lady in uniform there, and I said to him: "She is one of the ward maids of whom you were speaking." She overheard me say that, and just as quickly, she said to me: "No, I am a kitchen maid, not a ward maid." There was considerable concern upon her part that I misunderstood. There was a significant difference in her mind between the two positions. We are all sensitive to it, whether we are willing to admit it all the way or not.

To my mind *labor disturbances are caused more often by a whole series of minor issues than any major one.* I could go on for hours, and quote strikes that I have been familiar with, in which the so-called demands of labor unions have been washed out, once they have found that a series of minor adjustments would be cared for. I can remember a strike in the Northwest, where men were out for eleven or twelve weeks, with all the loss of income; all because the head of one of the lumber camps, instead of replacing the shower bath head with a real one, took an old tin can and punched holes in it. That, to them, was the last straw. There was a whole series of

minor difficulties, represented to them by an action of that sort.

Assuming, for a minute, all these principles as a background, how can we proceed within our own organizations? In this case, it would be the Anesthesia Department. How can we proceed to see what our status of morale is and try to do something about it? The first thing to do is to try to find out the true facts of the matter. I am sure if I talked to you, you would say: "My organization morale is perfect, and all my anesthetists love to work for me. They think I am grand."

We should take a skeptical attitude toward our morale—find out whether that is really and truly so. How are we going to do that? There are a great many ways. In your case, you can have somebody in some other phase of the hospital organization interview all the people who work in your department, having your people tell that person frankly just what's what. In the beginning, they can be told: "This is not going to affect your job in any way, but just tell me honest-to-goodness how your relationships are in the Anesthesia Department." Then, have them turn that information over to you, without mentioning names, so that you will know just how they feel about those things. It may surprise you to know the things which they might suggest which disturb their feelings toward you and the organization for which they work. Or, you might do it by telling these people frankly that you want this information and that you sincerely desire it. Ask each of them to send you an anonymous note as to what they honestly feel about conditions.

Another way might be to have somebody outside of your department interview every person who leaves your organization. Of course, they all leave because they are going "to get a better job." Or perhaps it is because they have a sick uncle. Then all of a sudden you discover they are working in another hospital and you are quite surprised that the sick uncle got well. Oh, yes, they are always going to get more salary and better working conditions. But if you can find somebody who can interview them to find out, really, why they left, you might be surprised.

Now, why should you be interested? Because you will be able to do a better job as a manager. You are going to have a better Anesthesia Department if you can find out what is the matter with you or the way in which the organization operates. You may have the best intentions in the world. You may be the most kindly person in the world. You may not be able, however, to recognize your own shortcomings. Once you find these out, whichever way you wish to use the information, you must have some machinery whereby you get a prompt way to do something about it.

Let us say that you have two anesthetists on call, and all of a sudden you say that beginning tomorrow morning we are going to have three on call. That would mean more night calls for everybody concerned, I suppose. The chances are that your subordinates are as mad as blazes about it. They get together at lunch and talk about it, and they decide that you are awfully mean, and, believe me, they are going to do things. Perhaps you discover that early. In fact, sometimes you can discover it by talking with them in advance of the change. Find out, if you can, how a change that you are considering really would react on them before you put it into effect. They can probably make alternative suggestions to you that might be perfectly satisfactory and solve the problem, if you took them into your

confidence early in the scheme of things.

That means to me that there must be some open channel for discussion of grievances. I lay great stress upon that. I should like to discuss it with you in terms of your relationship as a department head. I believe you are never going to have good, true morale, and, therefore, a good, effective operating department unless the employees below the department head have some easy way to go to somebody else in the organization with authority in order to discuss their disturbances and adjustments frankly.

Perhaps you are going to say: "Wait a minute. That steps upon my prerogative. I am the boss, and that is going over my head. That is undermining me." Well, the mere fact that you have that internal feeling is a shortcoming, in terms of your management. Your people will get their way in the final analysis, and do not kid yourselves into the idea that your subordinates' grievances do not get to the people on top. It may go along and take six months, maybe, but the information gets to the top eventually, in some way.

So why not face the burden? If that means that you have to adjust your technique, aren't you better off, having improved to that degree? There must be an open channel. I would think any superior you have who receives such a complaint would ask if that person had taken this matter up with the Chief Anesthetist, suggest that that procedure be followed and even suggest how to present it to you.

There are a great many phases of personal interests that we must consider. Take wages and hours, as an example. It is unfortunate in your organization, for example, if you do not have a definite plan worked out, whereby you start the beginning anesthetists at a certain salary, and whereby you tell them within a few months whether they are doing a good job or not, by raising their salaries. I would not make it automatic. I would not say that every three months they would receive an additional $5.00 irrespective of quality. Rather say to a person, "Every three months your work is going to be reviewed for a possible raise and the situation discussed with you." That means a great deal.

You know that some employees think that they are giving all and getting nothing. The situation must be discussed frankly, otherwise they say to themselves, "Let someone else rush around and worry until I get that increase in my wages." Or let one girl get a raise faster than somebody else without discussion, and the whole practice of morale is shot. If you tell them why they cannot get more money for their work, they can make up their own minds as to whether they wish to continue, or improve themselves from that standpoint.

Likewise, consider living conditions. As Chief of the Anesthesia Department, have you actually looked at some of the rooms your anesthetists occupy? Have you looked at them recently to see whether the superintendent painted them or did not paint them? Have you talked the living conditions over occasionally with your superior as to satisfaction or not?

Consider also the procedure of employment. Have you made it clear to the individual before she was hired just what was expected? Sometimes anesthetists are hired by telegraph. You have never seen each other up to date. You want another anesthetist very badly. You wired to some school and said: "Send an anesthetist." Of course, you do not know whether your personalities will mesh or not. You are greatly surprised in four months'

time when she wants to leave you; you do not understand it. A little more care in anticipating the need of new employees, and a little more frank discussion at that time will solve a great many problems of morale. Insist upon a visit to the institution. Display the conditions under which they are going to work. When they arrive, say to them: "I will tell you all the bad things about this job; I have never seen a job yet that does not have some bad things about it. Maybe you will not want the job when you get through with your survey of the place. If you do not want the job, then tell me so without embarrassment. You want to recognize that those are the conditions right now, and they will exist, probably, for some time to come."

Of course, if time permitted, I could go on to vacations and sick leaves and many other phases where your interests clash, but in which we must create an integration of interests. My urgent suggestion is to recognize these in the beginning and try to formulate definite policies in your department as to what you are going to do about it. Then make these policies clear to the employees when they are employed. Develop a large number of focal points of common interest to facilitate the building of an esprit' de corps.

The maintenance of morale, once developed, is a continuing process. High continuing morale is based on rational thinking, and not on emotional stimulation. Morale maintenance requires vision and a continuing exercise of initiative by the management in safeguarding the interests of the employees, as well as of the patients and the public.

There is a certain level of performance that may be maintained in an organization by close supervision and direction backed by authority. The difference between this and the maximum performance of which the organization is capable may be great. It depends upon the degree of morale that the organization possesses. While the work of morale development is complex and difficult, hospital management cannot afford to neglect it. High employee morale is an intangible but real asset worth the expenditure of time and money.

ORGANIZATIONAL ACTIVITY

CARL I. FLATH

Assistant Director, Michigan Hospital Service

Read at the meeting of the Michigan Association of Nurse Anesthetists, Detroit, Mich., November 9, 1940.

The earliest records of the treatment of the sick are to be found in Hindu and Egyptian history. Hindu literature relates that Buddha appointed a physician for every ten villages, and in the story of early Egypt we find that even in those pagan times there had developed an elaborate, though not very rational, system of medicine. In fact, from this era comes the first evidence of *anesthesia* being used to alleviate pain. The Egyptians, as you know, were the first to use drugs and narcotics, and in surgery, as a substitute for anesthesia, they adopted a procedure of hitting the patient adroitly on the head with a wooden mallet with sufficient force to render him unconscious without fracturing the skull — I presume they became proficient by a process of trial and error.

From those days to the present, the

hospital has had a romantic evolution through Greek and Roman civilization into the Christian era, on through the Middle Ages and the Renaissance until the end of the nineteenth and the beginning of the twentieth century, when it experienced its most rapid and scientific development. This evolution, it is true, had alternating dark and golden ages, but centuries of experiment and scientific discovery and public enlightenment have slowly broken down the barriers of ignorance and prejudice so that the hospital might attain the position it has today. Never in its history has it given the quality of sick care that is offered at the present time. Never before has its influence been so extensive and widespread. Never before has it played so important a part in the life of every community.

And in this whole general picture of the modern hospital, *you*, in your special field, are an important part. It is about your place in this field that I should like to talk with you for a few moments.

Historians are agreed that the sharpest upcurve in the development of hospitals occurred when Crawford Long discovered ether in 1842. However, because Long did not publicize his work, Morton is sometimes given credit for being the father of modern anesthesia. *But* whatever the source, we do know that its discovery has removed many of the horrors that hospitals previously engendered in the public mind. To comprehend fully its present significance, one has only to remember that in the United States more than three million surgical operations are being performed every year under anesthesia, without which a large portion of these life-saving services could never be undertaken. And so, as nurse anesthetists, you occupy a most important place in the day to day service of the modern hospital.

Now, I have not the slightest idea how many nurse anesthetists there may be in this country, but I know the number is high, and although your profession is relatively new in terms of years, you were *brought* into this field because *a need existed* for more trained anesthetists than the medical profession was able to supply. You have done a splendid job of filling that need. But there are those who would take *from* you the rights and place you have earned for yourselves. Therefore, if you are to preserve and protect your interests, you must present a united front.

In an attempt to do this you organized in 1931 your National Association of Nurse Anesthetists, which is fine, *but* the simple matter of *having* an association is hardly enough in itself. There must be a follow-through; there must be objectives and these objectives must be reached.

Frankly, I know very little about your association, its activities, objectives, program and budget. Perhaps, however, if I were to state your objectives as the fostering and encouraging of cooperative action for self-improvement and self-preservation, through local, regional and the national associations, in the interests of your calling and the welfare of the sick, I feel that I would not be far from right. It may be that you have been eminently successful in carrying out such a program and so what I may say to you is not said critically but rather as a reflection of my own thinking about your particular problem as it appears to me at this time.

Now, if your national, regional and local organizations are to be successful, there must be within them the proper spirit. By that I mean a spirit of unselfish cooperation; a spirit of helpfulness; a spirit of tolerance, not only among the individual members, but in your relations with other agencies

and interests having similar objectives. Should there be any doubt that your activities reflect these essentials, let me commend to you a little self-analysis, not only as individual members of your association but of your organization itself.

Any association is in the final analysis, only a reflection of the individuals who make it up, and if it is to be successful it must, as I have said, be cooperative, helpful, tolerant, and in addition it must be efficient and progressive. Above all, it must be well organized. If this is what you want of *your* association, is it not incumbent upon each component member to see that in her own sphere these qualities are to be found? You will say, "Oh, yes, in my department or in my hospital, all of these virtues are to be found." To feel that way is only natural, but to be sure, let us ask ourselves a few simple questions: Am I cooperative and unselfish in my relationship with my own medical staff and fellow workers? Am I making it my business to become interested in the whole general problem of the nurse anesthetist, and am I lending my cooperation and help towards the solution of this problem? Am I tolerant of the views of others as they might affect me? Am I efficient in my own activities, and am I contributing anything to my national association to make it more efficient? Am I progressing in my own work? Am I keeping abreast of every new development in the field? Am I assisting my profession by meeting the recommended standards of the national association? Am I keeping myself informed of the problems that face my field, and am I supporting the organized efforts of my co-workers to solve these problems? Am I interested only in "getting" something from the national association or am I "giving" to it something worthwhile?

Now these questions are simply thrown out to stimulate thinking and self-analysis. If they can all be answered affirmatively—fine. However, I am afraid if my observations have been correct, there are too few now in this field who could honestly answer all these questions in the affirmative.

Never in the history of the world was the need for association or organized effort more needed by a profession such as yours than it is today. On every side we see the importance and effect of organized effort reflected in every successful program where the interests of the group or field activity is involved. The truth of this is so apparent that to state examples seems hardly necessary, but you know very well that there was never a successful hospital that was not well organized. No political party has ever conducted a successful campaign without proper organization, and no community or social project has ever been successful without efficient organization to support it. And so it is with you—if you are to accomplish those things which you consider desirable; if you are to protect your interests from the forces from without which would destroy what you have built; if you are to extend and expand your field of usefulness—you must be organized. Each one of you must lend your moral and active support to your association, which itself must be united in purpose, efficient, democratic and strong, so set up as to inspire confidence, and having an objective program with a follow-through. Finally, it must be adequately financed.

As I have said, my knowledge of your budget is limited, but I *can* say this: you cannot successfully carry out those things which I have mentioned without adequate funds, for not only must you continually educate yourselves in the way you would go, but more important, you must educate all of those other groups and interests

which you would have think favorably toward your philosophy and your problems. In other words, you must have adequate funds to permit your regional and national organizations to fight your battles.

Your problem in this connection has only begun. As you know, certain attorneys general have ruled that the administration of an anesthetic is a medical act and, therefore it has been made illegal for the nurse anesthetist to practice in the states where such a law is in effect. There are other state legislatures now considering similar action. The right and wrong of this I am not here to question. I merely state certain conditions which are threatening you. In this connection, it might be interesting for you to know something of the budgets which other associations have set up to promote and safeguard their activities.

The American Bankers Association has a budget of $700,000 a year.

The American Institute of Accountants—$120,000 a year.

The Association for More Game Birds in America $110,000, if you please.

The National Rifle Association—$200,000.

Veterans of Foreign Wars—$230,000.

The American College of Surgeons—$225,000.

The American Dental Association—$240,000.

The National Committee for Mental Hygiene—$175,000.

The American Medical Association—$1,315,000.

Now all of these groups are *strong* because they have created a favorable public and professional attitude towards themselves and they know that to maintain this position they must carry on a continuous educational campaign among those whom they would have consider them favorably. So it is with you.

Therefore if I might leave one thought with you as individuals, it would be to get on the band wagon, support your organization which was established to protect and improve *your* status in the hospital field. Forget the petty problems which may exist in your own hospitals or departments. These are, of course, important to *you*, but, for the most part, they are your own personal problems, which generally speaking, can be solved by minor adjustments. If they are of a nature where a matter of association policy is involved, work through your association. *Think* in terms of your association; *act* in unison.

Among specific matters to which it would seem to me consideration might well be given at this time, are the following:

1. Continued effort towards the end of raising and maintaining minimum standards of education and training for your work. This means restrictive and supervisory control of schools where training is made available. Such work has already been undertaken by and through your national association. Support this program, for the day has arrived in almost every related field where only those properly qualified by education or experience will find a place. This is particularly true in the field of hospital administration. Boards of Trustees are being educated to the importance of employing only properly qualified administrators and as time goes on this is having the effect of raising the whole tone of hospital service in this country.

2. I would say that you should undertake through your national association, a program of education of hospital administrators and the medical profession. Convince them that you are an indispensable auxiliary in the modern hospital. Show them what

you are doing to raise your standards and increase your usefulness. Keep them informed.

3. Give consideration to the small hospital problem, remembering that 72 per cent of the hospitals in this country are under 100 beds, 33 per cent are 10 to 25 beds, 24 per cent 25 to 50 beds, and 18 per cent 50 to 100 beds. This picture should be studied. You cannot ignore it. It seems to me that special thought might be given to the matter of qualifying certain of your people to take over combinations of responsibilities in the small hospital. Such people, properly trained, will find the small hospital field waiting for them with open arms, and at the same time you will make your influence in your own special work felt in the small hospitals, where it is perhaps needed more than in the larger institution having a properly organized medical staff.

And finally, develop among your coworkers the spirit of "giving" rather than the spirit of "getting." So many people who should be supporting cooperative activities approach the problem by saying, "What am I going to *get* out of this?" rather than "What can I, in my small way, *give*?" A simple philosophy, true, but it is the only foundation on which successful association activity can be based.

Now a word about the attitude of hospital service plans to the nurse anesthetist. Inasmuch as the vast majority of you are employed by hospitals which are participating members of Michigan Hospital Service, and further because so many of you are already enrolled as subscribers with us, it will not be necessary for me to detail what is meant by a voluntary nonprofit hospital service plan. At this time throughout the United States there are sixty-six plans similar in purpose and organization to Michigan Hospital Service. The benefits provided by each plan have been established to best fill the needs of subscribers and hospitals served by the plan, in consideration of custom, both legal and organizational, in the particular community. Of special interest to you will be the fact that more than 50 per cent of the plans provide anesthesia service as a benefit when the administration is by a salaried employee of the hospital—in other words, a nurse anesthetist. Those plans, providing anesthesia as a benefit, have service contracts with more than 4,000,000 subscribers.

This augurs well for the nurse anesthetist. It is having and will continue to have the effect of consolidating the position of nurse anesthesia in those areas where legal contracts for such service have been entered into by the hospitals with this and an ever increasing number of patients. And while it is not the desire of service plans that there should be shown on the part of the subscribers any discrimination between hospitals, nevertheless there seems to be what I would suppose is a natural tendency for subscribers to indicate a preference for service in those hospitals where all benefits including nurse anesthesia are available.

It has been a real privilege and pleasure to be with you this evening and I wish for all of you continued success and progress in the place you occupy in the care of the sick.

DEPARTMENT OF EDUCATION

From the Department of Anesthesia, Barnes Hospital, St. Louis, Mo.

ELECTRICAL INTERCOUPLING

In view of the expanding interest in those phases of safeguards against anesthetic gas explosions that involve the identification and control of accidentally liberated charges of electricity, a simple glossary of terms commonly met with in current literature on the subject, seems timely. The following notes on this subject are accordingly published.

Electricity exists in two forms, namely:—

STATIC ELECTRICITY, or stationary electricity; electricity at rest.

CURRENT ELECTRICITY, or dynamic electricity, kinetic electricity; electricity at work, electricity in motion.

Charges of *STATIC* electricity are called *electrostatic* charges.

Charges of *CURRENT* electricity are called *electromotive* charges. The force which drives electric current through an electric circuit, is called electromotive force (written e.m.f.) or "voltage". It is explained on page 46.

STATIC ELECTRICITY, with which the anesthetist is concerned principally in connection with possible accidental ignition of inflammable anesthetic gases, may be produced by friction between dissimilar nonconductive materials. Typical illustrations are the well-known shuffling of the feet across a rug on a dry day, drawing a comb through dry hair, or rubbing a glass rod with a silk cloth or with a wool cloth — as well as the less well recognized frictioning of the tiny surface fibrils of blankets when the surfaces of the blanket are separated in unfolding, or when they are drawn across, or frictioned with, dry clothing. Friction between silk or rayon and other nonconductive materials also generates static charges. Articles can be also invested with static charges by what is termed "induction", from electrically charged objects which are adjacent.

While no article or material of any kind is entirely impervious to the passage of a current of electricity through it, certain materials are such poor conductors that for all practical purposes they are regarded as actually opaque to the conduction of electrical charges, and are, therefore, termed *insulators*. The classic examples of these are porcelain, glass and rubber (seen all around us in the form of insulation-covering for electric wires). The degree of strength of the insulating value of a given insulating material is called its *dielectric strength*. It in effect represents the voltage or force of electrical charge which it will withstand before its electrical resistance "breaks down" and permits the passage, or leakage, of a given electric current through it.

The relative conductivity (or nonconductivity) of various materials is a specifically measurable value, which indicates relative "facility of flow" or "conductivity" in the one case, and "resistance" to the flow of a given current of electricity through them in the other case. Rubber soles are nonconductive. Black composition soles vary in degree of conductivity according to the amount of metallic sub-

stances, such as carbon or graphite, which are incorporated into them during their manufacture. All white composition soles so far tested by us have been found to be nonconductive. Leather soles when dry are generally poorly conductive — although when very thin and wetted by perspiration, they evidence some degree of conductivity. Heels generally are nonconductive, although by reason of the length of the nails with which they are affixed to the shoes, electrical current is conducted through them when the nails themselves are brought into contact with a conductive system. Many oils are nonconductive, and therefore act as unrecognized insulators when they accidentally interject themselves into and between other elements of an intercoupling system.

The precise electrical conductivity (or nonconductivity) of a material is determined by instruments which measure the actual number of *ohms of resistance* which the material (or object) in question presents to a balanced electrical current which is "generated" for that particular purpose by the measuring instrument. In practice, the material which is to be tested is experimentally made a part of the electrical circuit, from which circuit all other resistances have been either removed or compensated for. The electric current is then generated, and the resistance which the test object presents to the passage of that current through the circuit, is indicated in "ohms" by the instrument's mechanism. Such an instrument is called a "direct-reading ohmmeter." It is calibrated in ohms, decimal divisions of ohms, or millions of ohms (megohms), according to the amplitude of the resistances which are to be measured. The "megger" which is frequently used for testing, high resistances particularly, is such a direct-reading ohmmeter, its name being a contraction of the words "megohm meter." The Weston ohmmeter is also a direct reading instrument. Its operating current is taken from a room circuit of suitable characteristic (voltage, et cetera) by means of a "plug in." The use of direct reading ohmmeters for determining electrical resistances eliminates the necessity of duplicate voltage readings and factor calculations which are entailed when the resistances are determined by means of voltmeters.

Objects which are to constitute a part of an "electrically intercoupled circuit" should not introduce such resistance to the circuit as will interfere with prompt conduction of static charges as they are generated—and should not unduly retard distribution of those charges to the various objects which are included within the intercoupled circuit that is desired to be kept at a balanced or equalized potential. While the values now stated may be revised in the light of further experiment, present standards indicate that a resistance of more than 1 megohm (1,000,000 ohms) should not be tolerated in any element of an intercoupled unit—and that when any element of the intercoupled group evidences an electrical resistance greater than 1 megohm, it should be either replaced, or "bridged around" by some material that is properly conductive.

All metals are good conductors of electrical current, although some are much better than others. While pure silver is the best conductor, copper (Matthiessen's pure copper at 0^{0} C.) is the standard to which other materials are usually compared. As a matter of interest, the following table is noted, to indicate the relative conductivity value of some of the metals commonly met with.

Pure silver	....about 106	%
Annealed copper	... 100	%
Aluminum	 61	%
Brass (copper and zinc)	 22	% to 44%
Pure iron	..... 17½	%
"Best Best" iron wire	13½	%
Pure platinum	..... 14½	%
Pure lead	..... about 8	%

Chemically pure water and pure ice are practically nonconductive. The presence of very slight impurities, however, renders water a partial conductor. Since water in nature is never free from impurities, undistilled water, as met with in practice, is conductive to electrical current.

Ordinary tap water is a good conductor. Therefore, materials which are wet with it conduct charges better than when dry. It is upon this general basis that high humidity is recommended in operating rooms, to facilitate dissipation or equalization of static charges.

As a further illustration of differences in degrees of "electrical conductivity" and "resistance" to electrical conduction, the following list of materials is grouped according to their conduction values:

Good conductors

1. Metals
2. Carbon, in the form of charcoal, coke or graphite

Partial conductors

3. Acids
4. Salt solutions
5. Plants and animals

Poor conductors, or insulators; presenting high resistance to the passage of electrical current.

6. Various oils
7. Dry wood
8. Silk
9. India rubber
10. Mica
11. Shellac (varnish)
12. Vulcanite
13. Paraffine
14. Porcelain
15. Glass
16. Dry air

ELECTRICAL POTENTIAL

Since the term "electrical potential" is so intertwined with the consideration of static electricity, electric intercoupling and static spark avoidance, its significance is set forth in some detail.

Electrical potential may be regarded as the "pressure" or "intensity" at which an electrical charge exists, in either an electric circuit or in an electrically charged object. In an electric circuit through which current is passing, this pressure or tension is strongest at the pole of generation of the current—and is weakest at the pole at the discharge end of the circuit. In fact, it is this higher pressure of the electricity at the generation end that drives the electric current through the circuit, and it is the lower pressure at the discharge end of the circuit which permits (or assists) the current to flow to it. It is this difference in pressure or "difference of potential" in the different parts of the electric circuit, that causes the electric current to flow through the circuit. It is called the *voltage* of the current (explained on page 46.

When an electrically conductive object contains a charge of electricity *at rest*, (no current flowing), all parts of the object remain at the same potential—hence there is no movement of the charge from one part of the object to another part of it. But if there exists near this first object another object which likewise contains a charge of electricity at rest, but such charge exists at a *different potential*, then if these objects are either purposely or accidentally brought into close proximity with each other, when

the distance between becomes so slight that the electrical charges can overcome the resistance of the nonconductive air which intervenes between them, a part of the charge from the higher potential object will "jump" the gap to the lower potential object, in order that the electrical potentials of the two objects may become "level" or "balanced" or "equal," and in jumping the gap, the charge does so in the form of an electric spark, of sufficient intensity to ignite inflammable or explosive mixtures which may exist at the area of the "gap-jumping charge."

Therein lies the reason for, and the importance of, keeping objects within an anesthetic area "balanced electrically" or at "equal potential to each other"—to prevent the creation of a dangerous "jump spark" when such objects (persons are included) are brought into close proximity to each other, during the manipulations and activities which necessarily accompany the anesthetic and operative procedures.

It is manifestly impracticable to prevent the *generation* of electrostatic charges within anesthetizing rooms, because of personnel activities which inescapably involve frictional contacts with nonconductive materials that are automatically present, thereby generating electrical charges of one degree or another. It is not impossible, however, to prevent *accumulation* of these charges on individual objects in the group from reaching dangerous "spark generating" *differences* of potential; and instead thereof, to distribute such charges when formed, among other members of the group. This result is accomplished by intercoupling electrically all members of the group, as a result of which each member of the group so intercoupled is kept at a relatively *balanced* electrical potential, thereby reducing the danger from "static spark" which occurs when objects exhibiting strong differences in potential are either purposely or otherwise brought near to contact with each other.

"Intercoupling," with its consequent equalization of electrostatic potential, should be studied as a separate subject from "grounding," or reducing to ground potential, although in many institutions the two are inter-related because of the fact that one part of the system that is to be intercoupled (a brass floor grid or other conductive floor) has been already installed and grounded. In such case, the objects included within the intercoupled group are both intercoupled *and* grounded; and, of course, are not only at equal potential with each other, but are also at equal potential with ground ("zero potential"). While grounding establishes an object at *zero potential*, it must not be inferred that the earth is devoid of electrical charge. The statement merely means that "ground" is arbitrarily adopted as zero potential standard in the field of electrokinetics, in the same manner that Greenwich is arbitrarily adopted as zero longitude in navigation—and as zero Centigrade in one system and 32 Fahrenheit in another system have been arbitrarily adopted as representing the temperature at which ice melts.

The essential feature involved in reducing the hazard from static spark, is the maintenance of a balanced or equalized electrical potential between those objects (including persons) which are necessarily present within the zone to be protected. This can be contributed to by means of various electrical intercouplings and by high humidification. If the intercoupled group is purposely not grounded, the integrity of the inter-

coupling is not impugned. Its balanced electrical potential will simply be established at a higher actual potential than if the same intercoupled group is grounded and is thereby kept at zero potential; but assessment of actual preferential value between these two specific features (an intercoupled group which is also grounded, versus the same intercoupled group which is not grounded) is still a matter of controversy.

SOME ELECTRICAL UNITS OF MEASUREMENT

Just as in their own respective fields, specific terms have been adopted to denote units of measurement of *length, weight, volume,* et cetera, so in the field of electrokinetics similarly specific terms have been adopted, to denote particular units of measurements of electrical values.

For purposes of illustration, some of the characteristics of an electric current have been likened to those of a flow of water through a pipe, wherein a given *unit quantity* of water, forced by a *stated pressure,* flows through a pipe (of a known frictional *resistance*) at a known *speed of flow per second,* yielding a *total amount of water flow per hour.*

The electrical analogues to the terms which have been italicized in the immediately preceding paragraph are, in their corresponding order:

coulomb, volt, ohm, ampere
and *watt hour*

To illustrate further: as the following commonly used terms carry the significance which has been noted against each:

cubic centimeters and pints, denoting definite units of *volume,*

grams and pounds, denoting definite units of mass or *weight,*

centimeters and inches, denoting definite units of *length.*

"cubic centimeters per minute" and "gallons per hour," denoting definite units of *volume of flow,*

millimeters of mercury and pounds per square inch, denoting definite units of *pressure,*

likewise, similarly specific units of measurement have been adopted in the field of electrokinetics, and carry the values which are noted against each below.

The "coulomb" denotes a basic *unit of quantity* of electricity, the unit being used principally for mere calculating purposes. The unit was named after the French physicist, Charles Augustin Coulomb, who died in 1806.

Theoretically, *one coulomb* is that amount of electricity which will deposit from solution a specific amount of metallic silver. (The amount of silver is 0.001118 gram, from a neutral solution consisting of 15 parts by weight of silver nitrate and 85 parts by weight of water).

But, while the coulomb is a basic unit of quantity, it is seldom used in practical terminology, because there is available a term which embraces not only the coulomb's mere "unit quantity," but also the "rate of flow" at which it is moving, and is, therefore, at once both more convenient and more inclusive. This universally used practical term is the "ampere" (named in honor of the French physicist, Andre Ampere, who died in 1836).

The "ampere" constitutes the *unit amount of flow* of electrical current. *One ampere* of electrical current denotes a flow of *1 coulomb per second.* Five amperes denotes a flow of 5 coulombs per second. Very small flows of current are measured in one-thousandths of an ampere (milliampere), one milliampere denoting a flow of

1/1000 coulomb per second (milli= 1/1000).

The "volt" denotes a definite *unit of force* (pressure) of an electric current. It was named after the Italian physicist Alessandro Volta, who died in 1827. Just as water requires pressure to force it through a pipe line, so does electricity require pressure to force it through a wire or other electrical circuit. This electrical pressure or "electromotive force" (written e.m.f.) which causes the current to flow through a closed electrical circuit, is called "voltage."

One volt is that amount of electromotive force required to drive a current of one ampere through a circuit which offers a resistance of one ohm. (See below for explanation of the "ohm"). It is to be visualized, however, that voltage itself does not *flow through* the circuit, any more than does the *pressure* of the pumping station flow through the water pipes. What flows through the pipes is gallons of water per minute. What flows through the electrical circuit is amperes of electricity. The pressure *drives* the current through; and that pressure must be continually maintained high enough to force the current through at the pressure desired. This pressure can exist within the system ("pounds per square inch" in the pipe line, or "volts" in the electric circuit) even when there is no actual flow occurring (when the faucet is closed in a pipe line or when the switch is turned "off" in an electric circuit; in each case, the flow being stopped). Even when electric lights are not burning, the pressure or voltage exists in the electric lighting circuit, ready to force the current through the resistant electric lamps at proper pressure, when the switch is turned "on."

As a matter of record, it is to be noted that when an electric switch is turned "off," its effect is to "open" or "break" the electric circuit. As a result of this "opening," or in effect, a "cutting" of the wire, a *space* filled with *air* intervenes between the ends of the "severed" wire. This dry air, being nonconductive, *prevents* the current from flowing between the severed ends,—and the electric current is, therefore, "blocked," "turned off" or "stopped"; or in other words, the electric circuit is "opened," its continuity as a closed circuit is "broken."

RESISTANCE. All substances offer some degree of resistance to the passage of an electrical current through them. In the case of a wire, or other element of an electrical circuit, the actual amount of this resistance to the passage of current depends upon the kind of material from which it is made, its thickness, its length, its immediate temperature, et cetera. The measurement of this resistance to the flow of electrical current has as its basis a definite material standard. That standard is the *electrical resistance of a column of mercury whose cross-section area measures 1 square millimeter.* Several different *lengths* of this column of mercury have been used to denote different standards, but the International Unit of resistance, the one now generally used, is based upon such a column of mercury measuring *106.3 centimeters in length, at zero degree Centigrade.* It is termed *"the International Ohm."*

The "ohm" then denotes a definite *unit of resistance.* The unit was named after the German physicist, George Ohm, who died in 1854.

One ohm is that amount of resistance which, when presented to an electric current that is driven by a pressure of 1 volt, will permit the passage of 1 ampere of electricity. To put it another way, an electrically

conductive material has a resistance of one ohm, when at an electrical pressure of 1 volt, the amount of electricity which flows through it, is 1 ampere.

When resistances are very small, they are expressed in terms of "microhms" (millionths of an ohm). When resistances are large, they are expressed in terms of "megohms" (millions of ohms).

The "watt" is the *practical unit standard* of *electrical power*. It was named in honor of the Scotch inventor James Watt (1736-1819), who devised the "horsepower" unit of mechanics.

The watt is described here chiefly to familiarize the student with the significance of the term, which appears on various pieces of electrical equipment that come under observation in clinical work. Most electrical apparatus is rated and marked, both as to the voltage of the current with which it is to be used and as to the amount of electrical power required to operate it. Thus, one electric lamp may be rated as a 115 volt, *25 watt* lamp, whereas another may be rated as a 115 volt, *50 watt* lamp. The significance of these designations is that whereas both lamps are intended for operation on a *115 volt* circuit, the second lamp will require twice as much power (consume twice as much) as will the first lamp.

As a matter of information, it may be noted that *one watt* denotes the power expended when *electrical pressure of 1 volt* causes *1 ampere of current* to flow. Its method of calculation of direct current power, consists of multiplying current voltage by current amperage, and stating the result in watts.

Thus, as in the terminology of mechanics "horsepower" designates the unit of mechanical power, so in the terminology of electrodynamics the "kilowatt" (1000 watts) designates the commercial unit of electrical power. One kilowatt is the equivalent of about one and one-third horsepower.

FORM AND COMPOSITION OF MATTER

All matter must exist in one of the three physical forms—solid, liquid or gaseous. A simple illustration of one substance exhibiting the three forms under different physical conditions, is water—which, while a liquid under ordinary circumstances, becomes a solid (ice) at lower temperatures, and becomes a gas (steam) at higher temperatures. The difference between the three forms is purely physical; no alteration in the chemical composition of the water has taken place.

An illustration of the difference between physical change and chemical change is evidenced by the heating of two kinds of metals, in one of which a mere temporary physical change results from the heating; whereas in the other an actual chemical change results from the treatment.

For instance, when a *platinum* wire is heated, it loses its silver appearance, takes on a red color, and gives off light if the experiment is conducted in a dark room. When the wire has cooled again, the metal returns to its normal color and to its non-luminous and other original properties—in other words, is exactly the same as it was before the heat-produced *physical* change took place. The change which it underwent did not in any way alter the chemical composition or properties of the platinum wire.

But when a *magnesium* wire is heated in the same way, the metal undergoes a *chemical* change, combining with oxygen from the air and *burning* with a bright light. When it cools, it is seen to have changed into an actually different material—a white powder, whose reaction there-

after is entirely different from the original magnesium wire. A *new material* has been formed. The change has been not merely in physical form, but also in chemical composition.

In a general way it may be stated that chemical changes are those in which there is effected a change in the composition of the substance (a new and different substance is formed), whereas physical changes are those in which the alterations are in form only.

Structurally, all matter, whether solid, liquid or gaseous, is composed of minute "molecules" of that exact substance. Each molecule of a particular substance is exactly like every other molecule of the same substance. The molecule represents the smallest division into which that substance can exist as itself.

But appropriate experiment has shown that each molecule, while the smallest existing division of its substance as that particular substance, can be broken down into still smaller units called atoms, which, while they do not exist in free form, are actually the basic fundamental simple building blocks from which all molecules are made. These atoms are the fundamental units of chemical exchange. They represent the smallest *material* unit of each of the 92 "elements" known to science.

But as small as these elemental atoms are, modern science has broken them down into still smaller divisions —not of *matter*, but of *energy* or *force*. Advanced theory today postulates that those supposedly "indivisible" atoms of matter, are in reality mere combinations of *electrical charges* (positively and negatively charged protons and electrons together with uncharged neutrons).

To reconstruct descriptively the order stated: charges of electrical energy, when arranged in certain patterns, form the elemental atoms of matter. These atoms of the 92 known elements combine chemically with one or more of themselves, to form molecules of the known compounds and substances.

Again, conversely, since all substances and the molecules of which they consist can be resolved chemically into their elemental atoms, and since these atoms can be resolved experimentally into electrical charges, it will be seen that the basic, indivisible unit of all substance—the thing, stuff or force of which all matter is made —is *electricity*.

HEADQUARTERS

American Association of Nurse Anesthetists
18 East Division Street
Chicago, Illinois

Miss Anna Willenborg, Executive Secretary

CONTEST

As announced in the November, 1940, issue of the Bulletin, Miss Agatha C. Hodgins, founder and Honorary President of the American Association of Nurse Anesthetists, has offered the following prizes for papers on anesthesiology, subject to be chosen by the contestant:

First prize — $35
Second prize — $15
Paper not to exceed 1000 words

The contest is open to students of Schools of Anesthesia whose dates of graduation from the school are between October 1, 1940, and June 1, 1941, inclusive. Papers to be submitted not later than June 1, 1941.

The following rules must be observed in the preparation of paper:

1. Material to be typed on one side of paper only, double space, with margin of at least one and a half inches on each side, top and bottom. Carbon copy should be retained for reference.

2. Pages should be numbered consecutively.

3. Photographs (on glossy paper), tables, drawings, graphs, et cetera, should be on separate sheets, numbered lightly in pencil on back, with title of paper, indication as to top and bottom, and the position in the text indicated by number.

4. Paper, including photographs and other illustrations, should be mailed in flat envelope, protected by sheets of heavy cardboard.

5. Material taken from other authors should be quoted exactly, and indicated by quotation marks, with full reference given, and permission obtained from the writer and the publisher if any considerable passage of a copyrighted work is used.

6. *References and Bibliography.* References to the literature and comments on various matters mentioned in an article that are to be used as footnotes should be numbered consecutively through the article, with corresponding superior reference figures in the text. Although in a printed article footnotes appear at the bottom of the page on which they are mentioned in the text, we would prefer in the preparation of the manuscript that they be typed in double space on a separate page following the text matter.

If the author has made an exhaustive review of the literature on the subject the references should be grouped in a bibliography at the end of the paper, arranged alphabetically by authors.

Both reference list and bibliography should give name and initials of author, title of the article, name of periodical and date of publication, or book in which it appeared, publisher and year of publication.

7. Papers to be sent to Miss Anna Willenborg, Executive Secretary, American Association of Nurse Anesthetists, 18 East Division Street, Chicago, Illinois, with separate letter giving full name, address, and School of Anesthesia.

No name or address to appear on manuscript. When received, each paper will be given a number, and the Educational Committee of the American Association will pass upon the papers with no knowledge as to the identity of the writer or the School of Anesthesia from which she was graduated.

NINTH ANNUAL MEETING

AMERICAN ASSOCIATION OF NURSE ANESTHETISTS

ATLANTIC CITY, N. J.

HOTEL HEADQUARTERS - - RITZ-CARLTON

September 15-19, 1941

Program Committee

Mrs. Helen Young Walker, Chairman

1824 Wallace Street, Philadelphia, Pa.

Mary A. Patterson, Cooper Hospital, Camden, N. J.

Edwina M. Irons, Episcopal Hospital, Philadelphia, Pa.

Magdalen Suter, Girard College Infirmary, Philadelphia, Pa.

Faye L. Fulton, Methodist Episcopal Hospital, Philadelphia, Pa.

Local Arrangements Committee

Mrs. Marion R. Briggs, Chairman

309 Mattison Avenue, Ambler, Pa.

Mrs. Della Logan Mifflin, Cooper Hospital, Camden, N. J.

Rose L. Furlong, Jewish Hospital, Philadelphia, Pa.

Orpha V. Foster, West Jersey Homeopathic Hospital, Camden, N. J.

Katherine Gagliardi, Lankenau Hospital, Philadelphia, Pa.

MAKE HOTEL RESERVATIONS EARLY.

Program and further particulars will be published in a later issue.

For information write Miss Anna Willenborg, Executive Secretary, American Association of Nurse Anesthetists, 18 East Division Street, Chicago, Illinois.

ACTIVITIES OF STATE ORGANIZATIONS

ARKANSAS ASSOCIATION ORGANIZED

Eleven anesthetists met at the Albert Pike Hotel, Little Rock, Arkansas, on April 25, 1940, to organize the Arkansas Association of Nurse Anesthetists, which is now affiliated with the American Association.

Mrs. Gertrude Alexander Troster of Memphis, Tenn., President of the Tennessee Association of Nurse Anesthetists, presided. A constitution and by-laws was adopted, and the following officers elected:

President
Martha Brown
Davis Hospital, Pine Bluff

Vice-President
Blanche Petty
1863 Chester Street, Little Rock

Secretary-Treasurer
Eva Atwood
Sparks Memorial Hospital, Fort Smith

Trustees
Olive A. Harder
Claudia E. Howard
Alice Green

MARTHA BROWN
President

CALIFORNIA

The California Association held its regular monthly meeting on November 7, 1940, at St. Mary's Hospital, San Francisco, with thirty-one members present. A detailed and interesting report of the American Association convention held in Boston, was given by Mrs. Myra B. Quarles.

It was decided that one meeting a year be held on Saturday evening so that out of town members might attend. Plans were made for the third annual meeting, which will be held at the Fairmont Hotel, San Francisco, California, March 4 and 5, 1941, in conjunction with the Association of Western Hospitals.

A buffet supper was served following the meeting.

TENTATIVE PROGRAM — ANNUAL MEETING

Tuesday, March 4, 1941

Registration

GENERAL SESSION

2:00 P.M.

Martha Bichel, President, Presiding

"Legislation Regarding the Nurse Anesthetist and Her Place in the Hospital"
LeRoy Brooks, M.D., San Francisco

"Sodium Pentothal Anesthesia in Oral Surgery"
Sophie Jevne, Los Angeles
Round Table Discussion

5:00 P.M.

Tea — Fairmont Hotel

Wednesday, March 5

GENERAL SESSION

2:00 P.M.

"Cooperation of the Anesthesia Department with the Administration of the Hospital"
Sister Mary Phillipa
St. Mary's Hospital, San Francisco

"Safeguarding against Anesthetic Hazards"
William H. Walsh, M.D.
Consulting Specialist on Hospital Planning, Chicago, Ill.

BUSINESS SESSION

4:30 P.M.

Martha Bichel, President, Presiding

Reports

Election of Officers

For further information write Mrs. Marian L. Lagan, Secretary-Treasurer, 5 Prado Street, San Francisco, California.

FLORIDA

The Florida Association of Nurse Anesthetists held its second annual meeting on November 2, 1940, in the Library of the Jackson Memorial Hospital, Miami, with Miss Marjorie Watts, President, presiding.

Following a dinner at the Seven Seas Restaurant, Dr. Colquitt Pearson spoke on "Carbon Dioxide." Plans were discussed for a "get-together" meeting of the anesthetists from the various districts of the state during the coming year.

Officers elected:

President	Marjorie Watts (re-elected) c/o Dr. T. C. McGuire, Plant City
Vice-President	Mrs. Mary C. Brown 1501 N. W. 2nd St., Miami
Secretary-Treasurer	Mrs. Mary F. Phillipoff Morton Plant Hospital, Clearwater
Trustees:	Mrs. Evon Compton Emily Barrett Jennie Card
Committees— Membership	Mrs. Ida Tedford Ellis, Chairman May Stroud Jennie A. Card

Revisions	Emily Barrett, Chairman Virtrece Adams Jean C. Regan
Finance	Mrs. Mary Phillipoff, Chairman Mrs. Lenella Bradbury Edna E. Hobbs
Education	Agnes M. Kelly, Chairman Mildred M. Kendall Helen K. Miller
Legislative	Mrs. Almida C. Green, Chairman Mrs. Evon Compton Margaret Creelman
Program	Mrs. Iva S. Grant, Chairman Mrs. Ida Tedford Ellis Michalina A. Kossack
Nominating	Mrs. Ida Tedford Ellis, Chairman Ina B. Vance Florence Kenney

ILLINOIS

Sixty members and guests of the Illinois Association of Nurse Anesthetists met at the Ravenswood Hospital, Chicago, the evening of November 11, 1940. A complete report of the annual meeting of the American Association of Nurse Anesthetists was given by Miss Nelle G. Vincent, Evanston Hospital, Evanston, Illinois, President of the Illinois Association.

An interesting talk was given by Dr. Hartley Mars, St. Francis Hospital, Evanston, on the subject "Convulsions Causing Death during Anesthesia." Dr. Clark A. Buswell, Ravenswood Hospital, Chicago, spoke impromptu on "The Nurse Anesthetist."

The sale of tickets for a turkey raffle added $325 to the treasury.

INDIANA

The fourth annual meeting of the Indiana Association of Nurse Anesthetists was held in Fort Wayne, Indiana, on October 13, 1940. The present officers were elected for another year, as follows:

President	Thelma A. Deane 130 W. Miami Avenue, Logansport
Vice-President	Inez Warnock Moore Clinic, Muncie
Secretary-Treasurer	Agnes M. Lange 326 Arcadia Court, Fort Wayne

The next annual meeting will be held in Chicago on May 7-9, 1941, in conjunction with the Tri-State Hospital Assembly. It is hoped that the Indiana Association will be represented 100 per cent if possible. For further information write Miss Agnes M. Lange, 326 Arcadia Court, Fort Wayne, Indiana.

IOWA

The Iowa Association held a meeting in November at Lutheran Hospital, Fort Dodge, and is happy to announce that the organization is now affiliated with the American Association of Nurse Anesthetists.

The annual meeting of the Iowa Association will be held in conjunction with the Iowa Hospital Association, at the Fort Des Moines Hotel, Des Moines, Iowa, April 21-23, 1941.

For further information write Miss Sylvia C. Abraham, Secretary, Mercy Hospital, Council Bluffs, Iowa.

MICHIGAN

Fifty members and guests were in attendance at the anniversary meeting of the Michigan anesthetists held November 9, 1940, at the Hotel Statler, Detroit.

Dr. Henry Harkins, A.B., M.A., Ph.D., F.A.C.S., Associate Surgeon Henry Ford Hospital, Detroit, gave a most interesting illustrated talk on his "Visits to European Clinics Just before the War." Dr. Harkins had been awarded a Guggenheim scholarship and spent nine months abroad.

Mr. John Mannix, Director, Michigan Society for Group Hospitalization, Detroit, was to have spoken on "Health Service Plans" but in his absence Mr. Carl I. Flath, Assistant Director, gave an instructive talk on "Organizational Activity" (published on page 36 this issue).

A meeting will be held on February 22 at St. Mary's Hospital, Detroit. At the afternoon session, beginning at 3:00 o'clock, a symposium will be given on the subject "A Review of the Anesthetics of 1940, and the Newer Methods of Administering Cyclopropane." The evening meeting, with Miss Miriam G. Shupp, of Strong Memorial Hospital, Rochester, N. Y., Past President of the American Association of Nurse Anesthetists, as guest speaker, will begin at 8:00 and close at 10:00 P.M., and it is hoped that there will be a large attendance at both sessions.

OHIO

The Ohio anesthetists will hold their eighth annual meeting on Wednesday, April 30, 1941, at the Deshler-Wallick Hotel, Columbus, Ohio, in conjunction with the Ohio Hospital Association.

The banquet of the Ohio Hospital Association, to which the anesthetists are invited, will take place on Wednesday evening, April 30.

For further information write Miss Mildred Sauers, Secretary-Treasurer of the Ohio Association of Nurse Anesthetists, City Hospital, 1803 Valentine Avenue, Cleveland, Ohio.

OKLAHOMA

The fifth annual meeting of the Oklahoma Association of Nurse Anesthetists was held in the Nurses' Home, Wesley Hospital, Oklahoma City, Oklahoma, on November 16, 1940.

Officers elected for 1940-1941:

President	Dixie Lee Diefenderfer Wesley Hospital, Oklahoma City

First Vice-President	Eleanor Smith Wesley Hospital, Oklahoma City
Second Vice-President	Mrs. Eula McNiel Parks McAlester, Okla.
Secretary-Treasurer	Julia D. Loftus Community Hospital, Elk City, Okla.
Historian	Mrs. Estelle Graham Valley View Hospital, Ada, Okla.
Trustees	
1st year—	Velma Page Smith
2nd year—	Mrs. Estelle Graham
3rd year—	Mrs. Beatrice W. Pitt
Membership Committee	Mrs. Beatrice W. Pitt, Chairman

PENNSYLVANIA

The annual meeting of the Pennsylvania Association of Nurse Anesthetists will be held in conjunction with the Hospital Association of Pennsylvania, at the Bellevue-Stratford Hotel, Philadelphia, Pa., on April 16 and 17, 1941.

Program Committee	Helen C. Shaughnessy, Chairman Howard Street, Bellefonte, Pa.
	Katharine F. Gagliardi Lankenau Hospital, Philadelphia
	Mrs. Albertine R. Leidy 51 North 40th Street, Philadelphia

For further information write Mrs. Helen Young Walker, Secretary-Treasurer, 1824 Wallace Street, Philadelphia, Pa.

District No. 1 of the Pennsylvania Association has elected the following officers for 1940-41:

President	Winifred M. Sherlock 191 West Godfrey Avenue, Philadelphia
Vice-President	Edith K. Redelberger 1512 West Louden Street, Philadelphia
Secretary-Treasurer	Josephine D. Casey Fitzgerald-Mercy Hospital, Darby, Pa.

ANESTHETISTS IN PITTSBURGH

The topics discussed in 1940 at meetings of the University Hospitals Nurse Anesthetists' Association of Pittsburgh, Pennsylvania, included:

"A Resumé of the History of Anesthesia" (with exhibits)
W. Harry Archer, D.D.S., Pittsburgh

"Hyperpraxia"
James Hodgkiss, M.D., Pittsburgh

"Anesthesia in Thoracic Surgery"
Harry R. Decker, M.D., Pittsburgh

Sometime in 1941 a lecture on "Shock" will be given by Dr. Moon of Philadelphia.

Upon invitation from the Dental School of the University of Pittsburgh,

Miss Mathilda M. Margison, President of the Pittsburgh Association, St. Francis Hospital, attended the unveiling of an oil painting of Horace Wells.

Dr. Archer is gathering antiquated anesthesia apparatus for a permanent collection, and will appreciate any information in regard to such articles; communications to be addressed to Dr. Harry Archer, Dental School, University of Pittsburgh, Pittsburgh, Penna.

VIRGINIA

The seventh annual meeting of the Virginia Association of Nurse Anesthetists will be held at the John Marshall Hotel, Richmond, Virginia, on April 26, 1941, closing with a banquet following the evening session. All members are urged to be present.

For further information write Miss Clara V. Anderson, Secretary-Treasurer of the Virginia Association of Nurse Anesthetists, Norfolk General Hospital, Norfolk, Virginia.

NEW YORK

The New York Association of Nurse Anesthetists will hold its eighth annual meeting at the Hotel Pennsylvania, New York City, on May 21-23, 1941, in conjunction with the Hospital Association of New York.

For further information write Miss Alice M. Racette, Secretary of the New York Association of Nurse Anesthetists, Ellis Hospital, Schenectady, New York.

TEXAS

PROGRAM

Sixth Annual Meeting

TEXAS ASSOCIATION OF NURSE ANESTHETISTS

Held in conjunction with the Texas Hospital Association

Adolphus Hotel, Dallas, Texas

February 27 and 28, 1941

Friday, February 27

GENERAL SESSION

9:00 A.M.

Mrs. Gertrude Tuley, Fort Worth, Presiding

Address of Welcome
J. H. Grosclose, M.D.
Superintendent, Methodist Hospital, Dallas, Texas

Greetings
Miss Ara Davis
Superintendent, Scott & White Hospital, Temple, Texas

"Premedication and Anesthesia for Infants and Children"
William H. Bradford, M.D., Dallas, Texas

"Anesthesia in General Surgery"
John V. Goode, M.D., Dallas, Texas

"Anesthesia in Chest Surgery"
Robert R. Shaw, M.D., Dallas, Texas

"The Requirements of an Anesthetist in a Small Hospital"
Rena F. Roemmele, Heights Hospital, Houston, Texas

"Recommended Precautions as to Grounding of Equipment in Operating Room for Inflammable Gaseous Anesthetics"
Raymond J. Schlegel

Luncheon — Century Room, Hotel Adolphus

12:00 noon

BUSINESS SESSION

1:00 P.M.

Report of annual meeting American Association of Nurse Aensthetists
Winnifred Hackworth, St. Joseph Infirmary, Houston, Texas

Joint Meeting with the Texas Hospital Association

Saturday, February 28

9:00 A.M.

Tour of Hospitals

WASHINGTON

The Washington Association has been very active since September, the Eastern Division meeting the first part of the month and the Western Division the latter part of the month. Minutes of the meetings are exchanged.

In November a dinner meeting of the Western Division was held in Seattle, with thirty-one anesthetists in attendance, including Miss June Roberts, President of the Washington Association of Nurse Anesthetists.

The annual meeting of the Association will be held in Tacoma, Washington, April 25 and 26, 1941, in conjunction with the Washington State Hospital Association.

For further information write Mrs. Mildred Peterson, Secretary, 705 Broadway, Seattle, Wash.

WISCONSIN

The Wisconsin anesthetists held their annual meeting in Sheboygan, on November 9, 1940, with twenty-nine members present.

Visits were made to St. Nicholas Hospital and Sheboygan Memorial Hospital. At the business meeting it was reported that sixteen new members were added during 1940. Miss Ann Blickendorfer of Milwaukee gave an interesting report of the annual meeting of the American Association held in Boston.

Miss Mary A. Yanulis, President, submitted the following question to the general membership: "Shall the Wisconsin Association of Nurse Anesthetists hold future annual meetings in conjunction with the Tri-State Hospital Assembly?"

At the general session the following papers were read, bringing forth active discussion:

"Preparation of Patient for Anesthesia"
Leslie M. Tasche, M.D., Sheboygan, Wis.

"Oxygen Therapy"
Paul B. Mason, M.D., Sheboygan, Wis.

"Preparation and Place of the Anesthetist in Red Cross Work"
Ann Brozovich

In the evening a banquet was held at the Foeste Hotel. Mr. Alvin Gillett acted as toastmaster, and the Rev. T. Parry Jones, guest speaker, gave a stimulating talk on "Everybody's Business." Music was furnished by Miss June Waldron and "The Notable Notes."

Officers elected:

President
Esther E. Edwards
Memorial Hospital, Wausau

First Vice-President
Mrs. Viola Taylor
2329 North 34th St., Milwaukee

Second Vice-President
Sister M. Furniss
St. Joseph's Hospital, Hartford

Secretary
Leone A. Thielen
St. Mary's Hospital, Racine

Treasurer
Melva Werking
St. Joseph's Hospital, Milwaukee

Trustees—3 year:
Mary A. Yanulis
Grace-Mary Teske

ESTHER E. EDWARDS
President

MID-SOUTH ANNUAL MEETING

PROGRAM

Seventh Annual Convention

MID-SOUTH POST GRADUATE NURSE ANESTHETISTS ASSEMBLY

held in conjunction with the Mid-South Post Graduate Medical Assembly and the Tennessee Association of Nurse Anesthetists

Hotel Peabody, Memphis, Tennessee

February 12 and 13, 1941

Wednesday, February 12

Registration — Hotel Peabody

9:00 A.M.

GENERAL SESSION

10:00 A.M.

Invocation

Address of Welcome

"The Responsibility of the Nurse Anesthetist"
Irene M. Mason, Greenville, Mississippi

"My Opinion of What an Anesthetist Should Know and Be Able to Do with the Pharynx, Larynx and Trachea"
Edwin N. Broyles, M.D., Baltimore, Maryland

"Postoperative Complications Related to Anesthesia"
Richard B. Cattell, M.D., Boston, Massachusetts

"Pentothal Sodium and Oxygen as a Total Anesthetic Agent in General Surgery"
Fred F. Rudder, M.D., Atlanta, Georgia

Luncheon — Hotel Peabody

12:00 P.M.

GENERAL SESSION

1:30 P.M.

"Anesthetists in Small Hospitals"
Martiel Sharpe
Rutherford Hospital, Murfreesboro, Tennessee

"Anesthesia and the Heart"
William D. Stroud, M.D., Philadelphia

"Some Permanent Values in Organization"
Agatha C. Hodgins
Founder American Association of Nurse Anesthetists
Chatham, Cape Cod, Massachusetts

7:30 P.M.

Banquet — Hotel Peabody

Mrs. Thomas Nelson Coppedge—Guest Speaker

Thursday, February 13

GENERAL SESSION

10:00 A.M.

"The Prevention and Treatment of Postanesthetic Pulmonary Complications"
Duane M. Carr, M.D., Memphis, Tennessee

"The Heart in Surgery"
Wallace M. Yater, M.D., Washington, D.C.

"The Preparation of the Crippled Child for Surgery"
Fremont A. Chandler, M.D., Chicago, Illinois

"My Experience with the Leech Pharyngeal Bulb Gasway"
Sister M. Borromea, O. S. F.
St. Francis Hospital, Peoria, Illinois

Luncheon

12:00 P.M.

Thursday, February 13 (continued)

GENERAL SESSION

2:00 P.M.

"Obstetrical Analgesia"
Jerome P. Long, M.D., Memphis, Tennessee

"Explosive Anesthetic Agents and Precautions"
Helen Lamb
President American Association of Nurse Anesthetists
Barnes Hospital, St. Louis, Missouri

"The Significance of Falls in Blood Pressure during Abdominal Operations"
D. B. Phemister, M.D., Chicago, Illinois

"The Present-Day Sphere of the Nurse Anesthetist"
Verne C. Hunt, M.D., Los Angeles, California

BUSINESS SESSIONS TO BE ANNOUNCED

Officers:

President	Alice Maurine Sims 704 Goodwyn Institute, Memphis, Tennessee
Vice-Presidents	Mazie L. Caldwell 919 E. McLemore, Memphis, Tennessee
	Martha Hubbard Junkin Cooper Clinic, Fort Smith, Arkansas
	Cordelia H. Hallett Gamble Brothers Clinic, Greenville, Mississippi
Secretary-Treasurer	Zelia C. Holland St. Joseph's Hospital, Memphis, Tennessee

TENNESSEE

The Tennessee Association as usual will meet in conjunction with the Mid-South Post Graduate Nurse Anesthetists Assembly, at the Hotel Peabody, Memphis, Tenn., February 12 and 13, 1941.

Officers:

President	Gertrude Alexander Troster 654 Stonewall Place, Memphis
Vice-President	Mary Grace Skinner Baptist Memorial Hospital, Memphis
Secretary-Treasurer	Jewelle C. Fink Physicians & Surgeons Building, Memphis

SOUTHEASTERN ASSEMBLY OF NURSE ANESTHETISTS

TENTATIVE PROGRAM

Third Annual Meeting

in conjunction with Southeastern Hospital Conference
Jung Hotel, New Orleans, Louisiana

April 17-18, 1941

Thursday, April 17

Registration — Jung Hotel

8:30 A.M.

GENERAL SESSION

Esther C. Myers, Presiding
President Southeastern Assembly of Nurse Anesthetists

Invocation
J. S. Land, D.D.
St. Charles Avenue Presbyterian Church, New Orleans

Greetings from Southeastern Hospital Conference
A. J. Hockett, M.D., President
Superintendent Tuoro Infirmary, New Orleans

President's Address
Esther C. Myers, New Orleans

"The Advantages and Dosage of Basal Anesthesia"
Mary Sims
Chief Anesthetist, Hotel Dieu, New Orleans

"The Importance of Posture Under Anesthesia"
Beata B. Clark
St. Joseph's Infirmary, Atlanta, Georgia

Remarks by Malcolm T. MacEachern, M.D.,
Associate Director, American College of Surgeons,
Chicago, Illinois

Luncheon — The Little Shop Around the Corner
—in the French Quarter

GENERAL SESSION

2:00 P.M.

Margaret A. Price, Presiding
President, New Orleans District Nurses' Association

"Anesthesia for Thoracic Surgery"
Michael De Bakey, M.D., Associate Professor of Surgery
Tulane Medical School, New Orleans

Discussion of Dr. De Bakey's paper will be led by
Evon Echols Compton, State Tuberculosis Sanatorium, Orlando, Fla.

Panel Discussion on Sodium Pentothal:

(1) Preanesthetic Care
Ruth Hyde, St. Vincent's Hospital, Birmingham

(2) Indications and Contraindications
Billie B. Caraway, Georgia Baptist Hospital, Atlanta, Ga.

(3) Types of Operations and Length of Time Administered
Fanny E. Gath, Druid City Hospital, Tuscaloosa, Ala.

(4) Administration of Drug
Halo H. Warman,
President, Georgia Association of Nurse Anesthetists
Emory University, Ga.

(5) Postoperative Treatment
Ruth Hyde, Birmingham, Ala.

(6) Summarization from a Pharmacological Aspect
Chapman Reynolds, M.D.
Associate Professor of Pharmacology,
Louisiana State University Medical School, New Orleans

Business Sessions of State Associations.

Friday, April 18

7:00 A.M.

Refreshments—Anesthesia Department, Charity Hospital

7:30 A.M.

Clinics in Operating Rooms—Charity Hospital

GENERAL SESSION

10:30 A.M.

Jung Hotel

Frances Bishop — Presiding
President, Alabama Association of Nurse Anesthetists

"Explosion Hazards in the Operating Room"
Lewis H. Wright, M.D., Director, Department of Anesthesia
E. R. Squibb & Sons, New York City

"Accidents in Anesthesia"
Mrs. Sam Owen
Chief Anesthetist, Shreveport Charity Hospital, Shreveport, La.

Roll Call by States

GENERAL SESSION

2:00 P.M.

Eletta Engum — Presiding
Anesthesia Department, Charity Hospital, New Orleans

"Educational Objectives of American Association of Nurse Anesthetists"
Agatha C. Hodgins
Honorary President, American Association of Nurse Anesthetists

Symposium: Postoperative Pulmonary Complications
Conducted by John S. Harter, M.D., Sanatorium, Miss.

(1) Surgeon's Point of View
F. F. Boyce, M.D., New Orleans
(2) Anesthetists's Point of View
Frances Bishop, Birmingham
(3) Internist's Point of View
R. H. Bailey, M.D.
Assistant Professor of Medicine,
Louisiana State University of Medicine
(4) Nurse's Point of View
Marguerite Paetznick
Assistant Director of Nursing Service,
Charity Hospital, New Orleans
(5) Summarization and Treatment of Cause
John S. Harter, M.D., Sanatorium, Miss.

BUSINESS SESSION

Reports of Officers and Committees
Election of Officers

Banquet — Jung Hotel

Saturday, April 19

Clinics — Hospitals in New Orleans

Demonstration of Gas Therapy Equipment — Charity Hospital
Esther C. Myers

Arrangements for Sight Seeing Tours will be made and announced

---

The Jung Hotel is located three blocks from Charity Hospital. The Hotel New Orleans is one block, and the Roosevelt Hotel about three blocks, from the Jung Hotel.

RESERVATIONS SHOULD BE MADE EARLY, AS A LARGE ATTENDANCE OF ALL GROUPS IS ANTICIPATED.

For further information write Miss Esther C. Myers, President of the Southeastern Assembly of Nurse Anesthetists, Charity Hospital, New Orleans, Louisiana.

The following state associations affiliated with the Southeastern Assembly of Nurse Anesthetists will meet in conjunction with the Southeastern Assembly:

	Secretary
Alabama	Hattie M. Barnes South Highland Infirmary, Birmingham, Ala.
Florida	Mrs. Mary F. Phillipoff Morton Plant Hospital, Clearwater, Fla.
Georgia	Clara Mahoney Crawford W. Long Mem'l Hospital, Atlanta, Ga.
Louisiana	Mrs. Joseph Coco 3435 Louisiana Avenue Parkway, New Orleans, La.
Mississippi	Susie May Collins c/o Drs. Trudeau and O'Mara, Biloxi, Miss.

In Memoriam

Mrs. Katherine Kelly Schriver McCarthy, of Denver, Colorado, who was graduated from the University Hospitals of Cleveland School of Anesthesia on September 1, 1935, and had been a member of the American Association of Nurse Anesthetists since that time, passed away on January 5, 1941.

Mrs. Bernice Rettig Teal, a member of the American and Michigan Associations since 1936, died November 11, 1940, in Auburn, Indiana. Mrs. Teal was graduated from the University of Michigan School of Anesthesia in 1922. She was a member of the Anesthesia staff at the University Hospital in Ann Arbor from January, 1923, to October, 1940, and First Assistant from 1928 to 1938.

Miss Moneta Mae Campbell, of the Passavant Hospital, Chicago, Illinois, died on November 15, 1940. Miss Campbell was graduated from the Ravenswood Hospital School of Nursing in 1921 and from the Ravenswood Hospital School of Anesthesia in 1925.

MID-WEST ASSOCIATION OF NURSE ANESTHETISTS

The second annual meeting of the Mid-West Association of Nurse Anesthetists will be held in Kansas City, Missouri, April 24 and 25, 1941, in conjunction with the Mid-West Hospital Association.

This organization includes the anesthetists in Arkansas, Colorado, Kansas, Missouri, Nebraska and Oklahoma.

Officers:

President	Ann Cox Missouri Baptist Hospital, St. Louis, Mo.
Secretary-Treasurer	Edith Marcum Jewish Hospital, St. Louis, Mo.

For further information write Miss Edith Marcum, Jewish Hospital, St. Louis, Mo.

FORM OF BEQUEST OR CONTRIBUTION

In response to inquiries reaching the headquarters of the American Association of Nurse Anesthetists the following form is suggested as a proper one to follow:

"I give, devise and bequeath to the American Association of Nurse Anesthetists' Trust Fund the sum of.....
.....dollars, or property or holdings as follows:

All income from the Fund known as the American Association of Nurse Anesthetists' Trust Fund will be used for the aged and indigent nurse anesthetists who qualify for participation in the benefits of said fund as stated in Trust Fund Document.

Signed.....

(Address in full).....

Date.....

BULLETIN OF THE AMERICAN ASSOCIATION OF NURSE ANESTHETISTS

The Bulletin of the American Association of Nurse Anesthetists is published by the American Association of Nurse Anesthetists; Executive, Editorial and Business Offices, 2065 Adelbert Road, Cleveland, Ohio.

Publishing Committee: Gertrude L. Fife, Chairman; Harriet L. Aberg, Rose G. Donavan, Barbara Brown.

Entered as second class matter February 6, 1937, at the Postoffice at Cleveland, Ohio, under the Act of March 3, 1879.

Published quarterly; subscription price—members 50¢ per year; non-members, $1.00 per year.

EDITORIAL COMMUNICATIONS

The Bulletin invites concise, original articles on anesthesia. Description of new technics and methods are welcomed. Articles are accepted for publication with the understanding that they are contributed solely to the Bulletin of the American Association of Nurse Anesthetists.

Manuscripts submitted for publication may be sent to Gertrude L. Fife, University Hospitals, Cleveland, Ohio.

The American Association of Nurse Anesthetists does not hold itself responsible for any statements or opinions expressed by any contributor in any article published in its columns.

Manuscripts. — Manuscripts should be typewritten on one side of the paper only, with double spacing and liberal margins. References should be placed at the end of the article and should conform to the following style: viz., name of author, title of article, and name of periodical with volume, page, and year.

Illustrations accompanying manuscripts should be numbered, provided with suitable legends, and marked on margin or back with the author's name, Authors should indicate on the manuscript the approximate position of text figures.

Illustrations — A reasonable number of half-tones will be reproduced free of cost to the author, but special arrangements must be made with the Chairman of the Publishing Committee for elaborate tables or extra illustrations.

Reprints. — Fifty or more reprints may be obtained at a nominal cost if ordered within fifteen days following the date of publication of the Bulletin.

BUSINESS COMMUNICATIONS

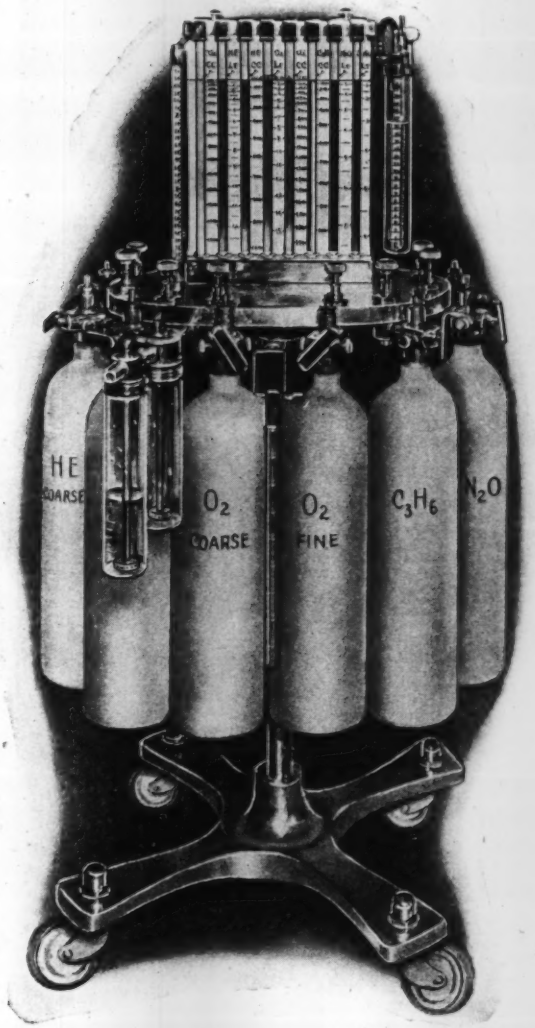
All communications in regard to advertising, subscriptions, change of address, et cetera, should be addressed to the Chairman of the Publishing Committee, 2065 Adelbert Road, Cleveland, Ohio.

The Chairman of the Publishing Committee should be advised of change of address about fifteen days before the date of issue, with both old and new addresses given.

Because of the second class postal rates in effect the Postoffice does not forward the Bulletin unless extra postage is sent to the Postoffice to which the Bulletin was originally mailed.

Non-Receipt of Copies. — Complaints of non-receipt of copies should be made within ten days following date of publication, otherwise the supply is likely to be exhausted.

THE PARAGON OF 1940



8 Flowmeter Unit

With the following correctly calibrated flowmeters

Helium fine ....max. 1000 cc.	Cyclopropane ..max. 1000 cc.
Helium coarse ..max. 12½ Lt.	Nitrous Oxide ..max. 8 Lt.
Oxygen fine ....max. 1900 cc.	Ethylene .....max. 6 Lt.
Oxygen coarse .max. 15 Lt.	Carbon Dioxide max. 1500 cc.

"Used with eminent satisfaction for more than a year in the thoracic surgery clinic of Dr. Evarts A. Graham at Barnes Hospital, St. Louis."

THE FOREGGER COMPANY

New York, N. Y.

Note.—Conductive rubber tires, breathing bags, tubings, etc., now available for your Foregger equipment.

The Satisfaction of BEING SURE!

Each day you are confronted with the responsibility and recovery of those who enter your surgery with confidence.

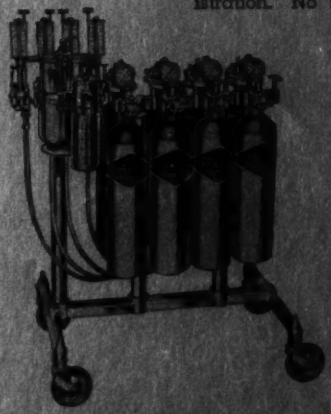
You know that their recovery is to an important degree dependent upon the scientific administration of anesthesia. There's nothing in the world that can substitute for the satisfaction and peace of mind that comes from **being sure** that your anesthesia equipment is safe, dependable . . . the finest to be had.

For many years, leading physicians and hospitals have universally recognized and acknowledged the

HEIDBRINK KINET-O-METER

The Standard of Excellence

It is scientifically correct, safe, simple and economical. There are no concealed rubber bags, diaphragms or other perishable parts to control gas pressures and flow. It's accurate, trouble-free DRY FLOAT Flow Meters assure positive and easily controlled administration. No freezing, no filling, no sediment, no cleaning . . .



KNOW THE SATISFACTION OF BEING SURE

Write for our interesting KINET-O-METER Brochure. Just mail the coupon . . . no obligation, of course.

OHIO CHEMICAL & MFG. CO.

PIONEERS AND SPECIALISTS IN ANESTHETICS

1177 Marquette Street Cleveland, Ohio

BRANCHES IN ALL PRINCIPAL CITIES

OHIO CHEMICAL & MFG. CO. NA 11-49
CLEVELAND, OHIO

Gentlemen:
Please send the Kinet-O-Meter brochure giving complete details and specifications.

NAME_____

ADDRESS_____

CITY_____ STATE_____